THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXII. No. 1851.] LONDON, NOVEMBER 1, 1898. [50TH YEAR. PRICE 6d.

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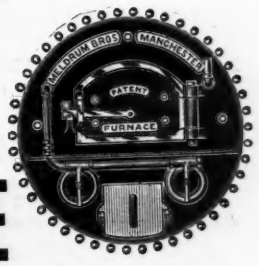

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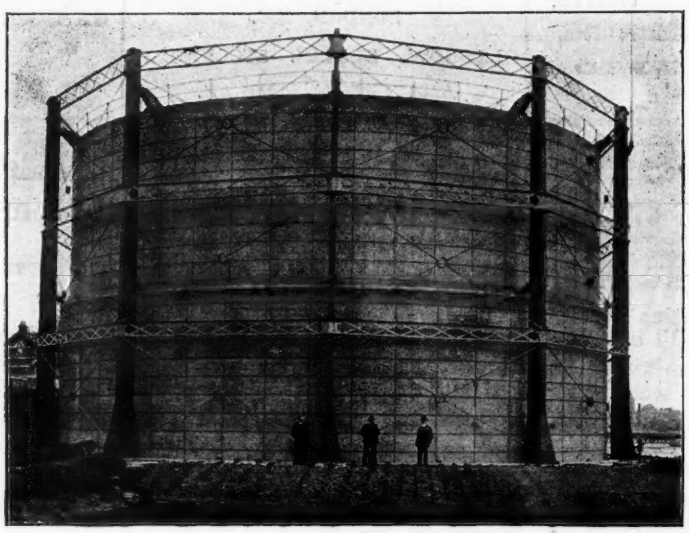

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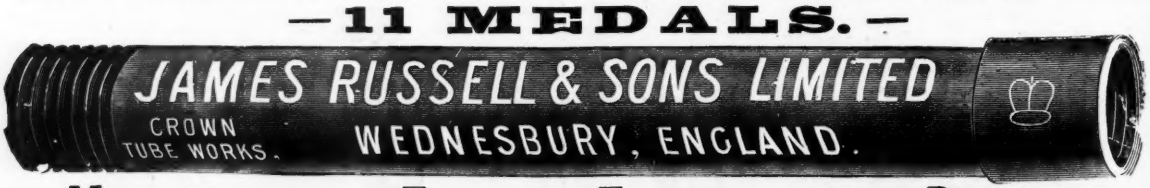

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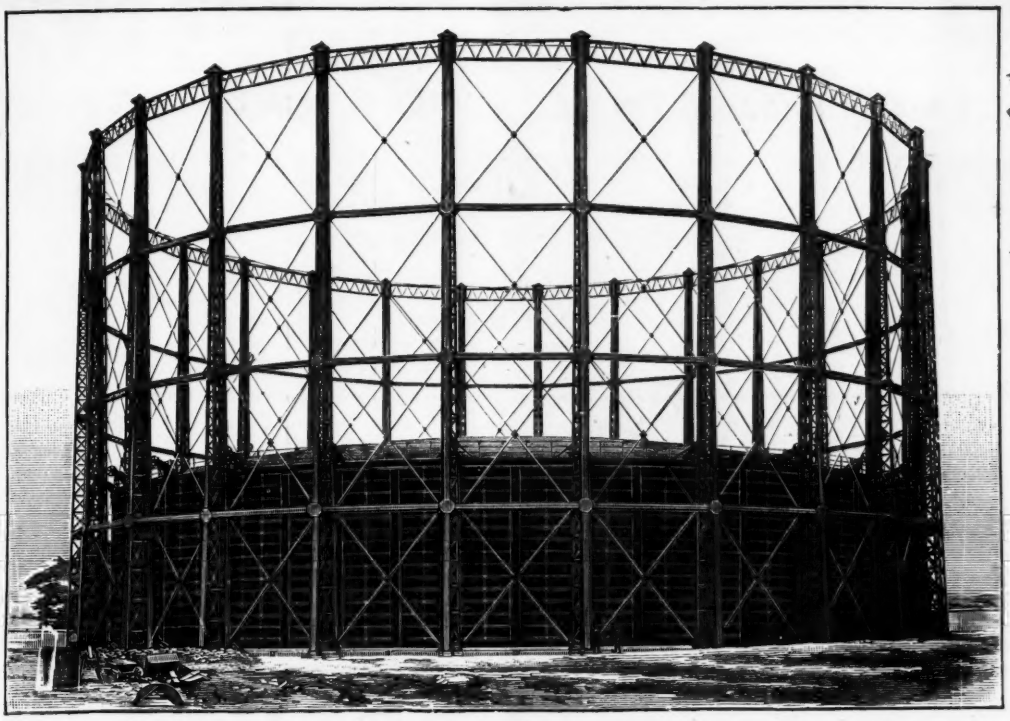

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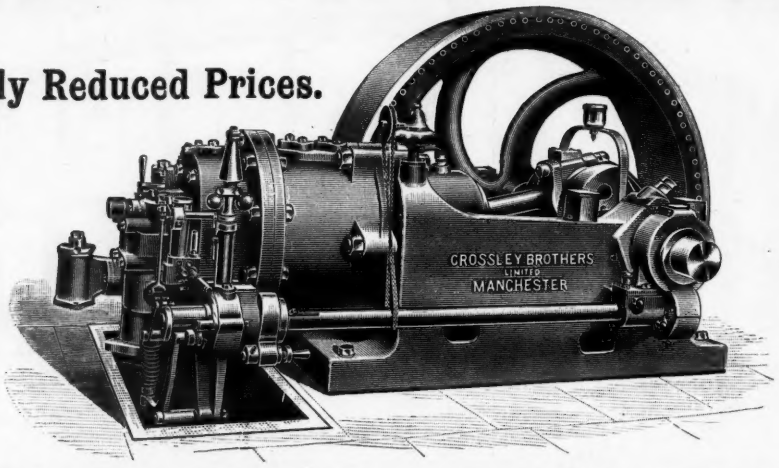

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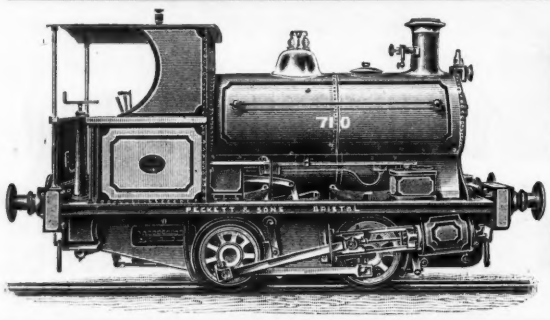

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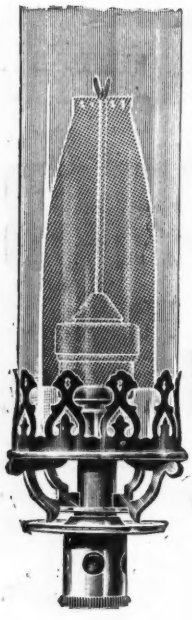

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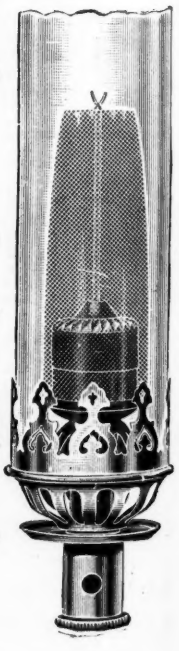

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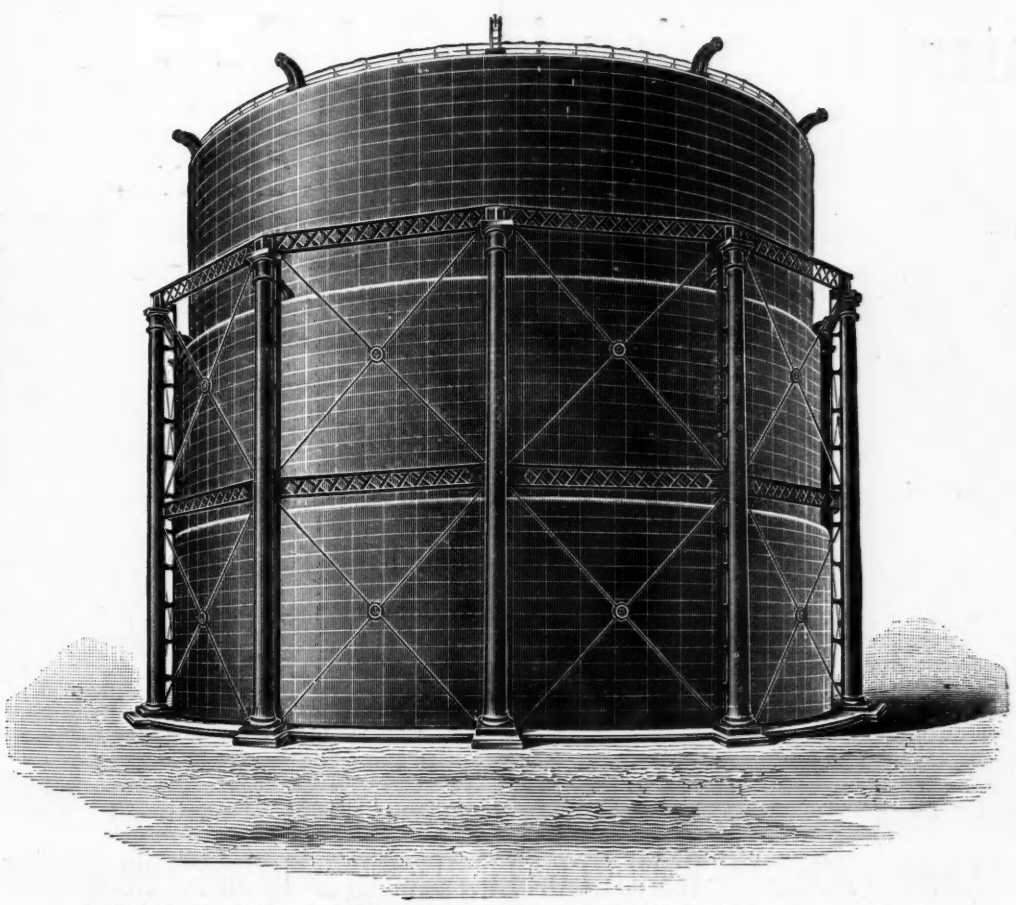

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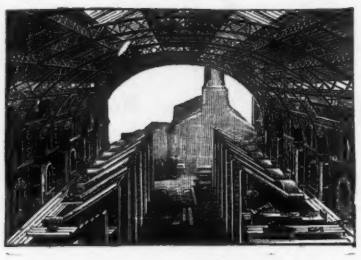

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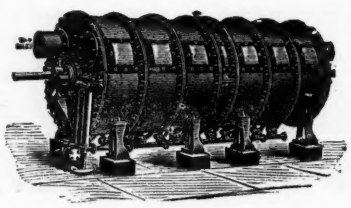

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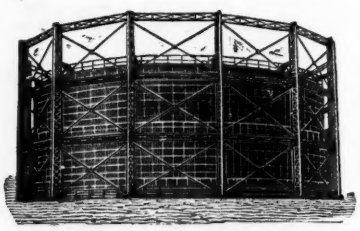

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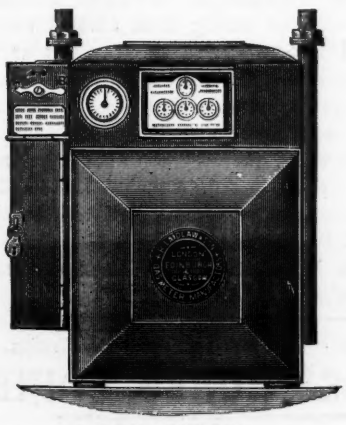

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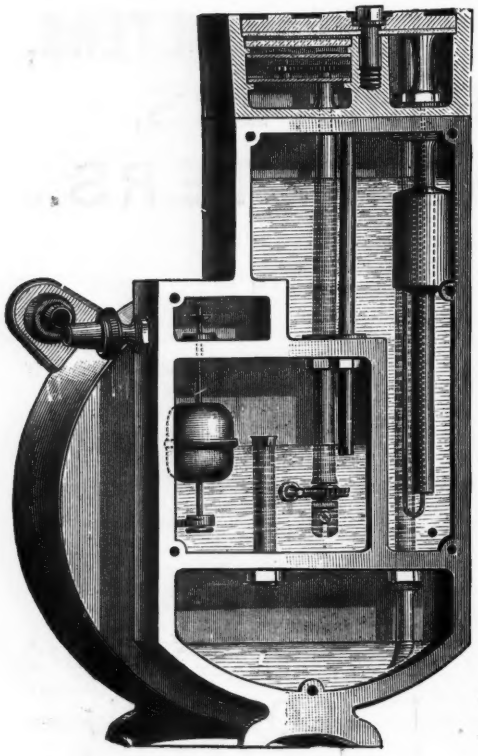

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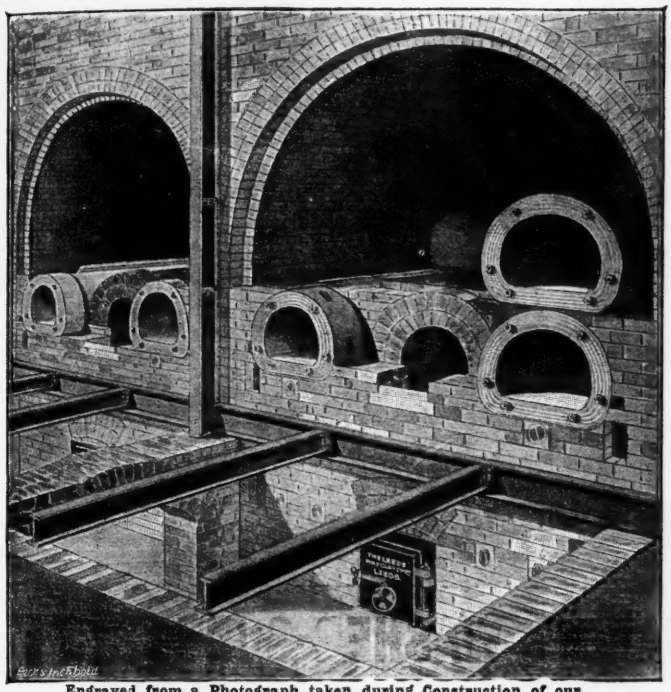

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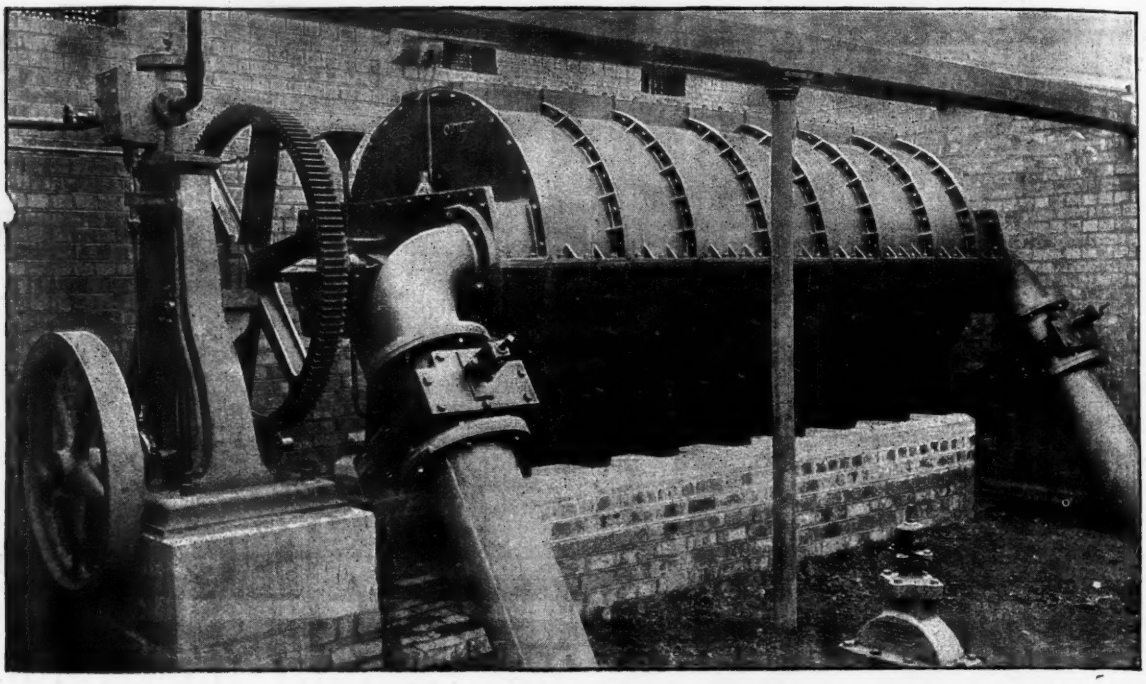

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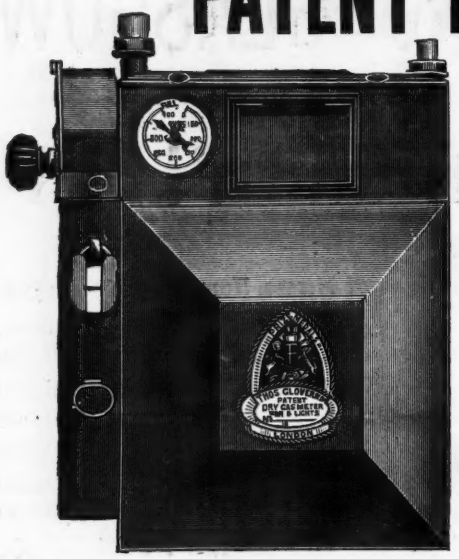

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EDITORIAL NOTES.

The Gas Companies' Protection Association.

THE First Annual General Meeting of the Gas Companies' Protection Association was held last Thursday, at the Westminster Palace Hotel—Mr. George Livesey in the chair. There was a representative, but not a large, attendance; and the tone of the proceedings was businesslike, if somewhat subdued. The truth of the matter is that, while it is a new thing for the representatives of Gas Companies to find themselves banded together for mutual protection, they must recognize in one another the dwindling survivors of an older industrial period. The age of Gas Companies has not passed, nor is it passing away; but the continued existence and assured future of the remaining Gas Companies, big and little, cannot obscure the reflection that the service has been municipalized to a very large extent. Reference was made in the course of Thursday's proceedings to the older organization of Gas Companies in their own defence; but times have greatly altered since that Association flourished. The Gas Companies that remain in the land should be drawn more closely together than was possible of yore; and it begins to look as if the new Association were quite competent to facilitate this union. There appears to have been a little misunderstanding at the outset as to the qualification for membership of the Association. It was by no means certain at the start that an organization of the kind could be brought about; and, in order to test the feelings of possible members in this regard, prospectuses of the proposed Association were sent to Gas Companies having a capital of £30,000 and upwards. The response was satisfactory, and assured the formation of the Association; but the limitation of the invitation created an impression among the smaller Gas Companies that they were not esteemed eligible for membership. This was an entire mistake, and has now been corrected. All *bonâ fide* Gas Companies will be welcome to join the Association; and the smallest concerns will have the advantage of knowing that their legitimate interests will be watched over by an organization which contains, and is advised by, the most experienced representatives of the gas industry of the United Kingdom. The rules of a trade protection society may as easily be too wide as too narrow; and it is not to be wondered at that there should have been some discussion of the way in which the Association will act. One rule permitted the Association—that is, the Committee—to "take proceedings;" and this sanction alarmed the Liverpool Gas Company, not without reason. Eventually it was agreed, on the motion of Mr. H. E. Jones, to limit the office of the Association to informing the members as to all proceedings threatening to affect the interests of Gas Companies. Since Mr. William King afterwards allowed himself to be placed upon the Permanent Committee, it is to be supposed that he was satisfied with this amended rule. Circulars inviting all British Gas Companies to join the Association are now to be sent out; and the Association will be fully equipped for dealing with whatever business it may find to do during the ensuing parliamentary session.

The Midland Association Meeting—An Annoying Incident.

THE prospect of an opportunity of inspecting the new gas-works which, under Mr. Henry Hack's direction, are being built at Saltley, was sufficient inducement to the members of the Midland Association of Gas Managers to make last Thursday's meeting in Birmingham one of the strongest (numerically) of the past few years. Before the visit there was a short programme of business to be got through; but, short as it was, it gave rise to a regrettable incident which had a disturbing influence on the remainder of the day's proceedings. A paper had been promised for the meeting by Mr. W. S. M'Gregor, on the reconstruction of the Longton Gas-Works; and in the publication of an article on the subject in the "JOURNAL" before the meeting, the Committee thought they saw something which affected the dignity of the Association. With altogether inordinate haste, they arraigned, tried, and condemned Mr. M'Gregor on the flimsiest of evidence; and subsequently, at the meeting of the members, the "JOURNAL" was unfairly implicated in the matter—the impression being created that the article in our columns and the paper by Mr. M'Gregor were identical productions, or at any rate had some intimate relation to each other.

That it is not so is shown by the explanatory statement with which we open our report of the proceedings at the meeting (see p. 971); and certainly it should not require any very laborious exercise of mental power to compare the article and paper, and establish their distinct origin.

The whole question really hinges on the point as to whether Mr. M'Gregor was responsible for the fixing of the opening day for the new works on Oct. 20, which date enabled the "JOURNAL" to report upon the event in last Tuesday's issue. At the meeting of the Association, Mr. M'Gregor emphatically said: "The opening day was not "fixed by me;" and it was unfortunate—indeed, it is more than surprising—that, on this assertion, the gentlemen who had been sitting in judgment on him and the paper (having themselves worked under Gas Committees and Directors, and knowing how frequently their own wishes have to be subservient to those of the bodies by whom they are engaged) did not at once see that any liability for what they deemed to be a grievance did not rest with the person on whom they had cast it. If they had done so, the matter might have ended then and there. It is true, as will be seen by the report, that late in the day the Committee of the Association were led to make some atonement. But at the same time we cannot help feeling that the unpleasantness surrounding the affair, and the pain occasioned to Mr. M'Gregor, might have been avoided by a little judicious inquiry before the meeting, the opportunity for which was just as available then as after the mischief had been done.

Beyond the remarks made on this subject, there was little to engage the attention of the members at the business meeting. The officers for the ensuing year were elected; and the honour of the presidency was bestowed upon Mr. J. S. Reeves, of Bilston, than whom few have done more excellent work in the administration of the affairs of the Association. He is succeeded in the vice-presidency by Mr. J. F. Bell, of Stafford, whose work in the profession will ensure for him a hearty welcome to the higher office in twelve months' time. The visit to the Saltley Gas-Works was the most successful part of the day's proceedings; and the indebtedness of the Association to Mr. Hack for this and previous favours was fully acknowledged.

Municipalization at Falmouth.

FALMOUTH has a way of managing local affairs which is peculiarly its own. For several years past it has been talking more or less seriously of municipalizing the gas and water works. An incentive to this course exists in a clause in the Gas Company's Act of 1890, which empowers the Corporation to acquire the works on arbitration terms; while periodical scares about the purity of the water supply have given colour to the demand that control of the means of supply should be vested in the Corporation. Two years ago this body, in a half-hearted way, came to the conclusion that the time was opportune for buying up the two undertakings. They consulted Mr. A. Silverthorne; but though he reported in favour of the purchase, the members of the Corporation were by no means enthusiastic over it. When the statutory meeting of ratepayers was called, the Mayor submitted a resolution in favour of the scheme without a single word of explanation or commendation; remarking that it was for the meeting to say "aye" or "nay" to the proposal, and it was all the same to him. With such an introduction, the end was not far to seek. The opponents of the scheme then took possession of the meeting; not a single word was spoken in support of the scheme; and consequently the result of the vote was its unanimous rejection. Again the matter has cropped up; for the time has now arrived when the powers of purchase vested in the Corporation must be exercised if they are not to be allowed to drop. The scheme has therefore been revived. This time Mr. Silverthorne reports even more strongly in favour of municipalization, though the financial outlook, as shown by his figures, seems less rather than more favourable. For instance, he puts the cost of the gas-works to the ratepayers at £36,450, as compared to £53,750 in 1896, while that of the water-works is increased from £56,050 to £60,875. This means, of course, an additional requirement for interest and the sinking fund. Singularly enough, Mr. Silverthorne also increases his estimate of the cost of the proceedings in Parliament, though the previous sum was thought, even by the supporters of the scheme, to be so serious an item that failure to obtain the Bill would be overwhelming. This time he has found that the Corporation are in a more complacent mood.

The preliminary proceedings have been got through without serious hitch; and though some of the members of the Corporation were reluctant to commit themselves to a positive declaration, the statutory resolution was passed by something more than the necessary majority. The remarkable part of the proceedings was reserved, as on the previous occasion, for the ratepayers' meeting. This time the mayoralty is vested in a gentleman of a different character from the one who expressed such complete indifference in regard to the result a couple of years ago. Mr. Deeble, it was seen, not only himself spoke in favour of the scheme, but took care that no one spoke against it. The outcome was that the resolution was put and declared carried without a single argument in opposition to the proposal having found expression, although there were clearly many opponents present at the meeting. This way of confining speeches to the advocates of one side is peculiar to Falmouth, and will, it is to be hoped, remain so. As an excuse for the Mayor's action, it has been said that the effect of it will be to leave the burgesses free to vote quietly and without excitement upon a question of great local importance. It would have been more in accordance with English ideas of justice if both sides had had their say before the vote was taken.

Cases under the Workmen's Compensation Act.

IT was mentioned in this column last week that the County Court Judge at Liverpool had reserved judgment in a case under the Workmen's Compensation Act where the victim of an accident had left property for the widow which constructively rendered her less dependent upon his workman's earnings. Judgment has since been delivered for the full amount of compensation provided for by the Act; thus excluding all consideration of the independent estate. His Honour Judge Collier took a week to consider the point, and concluded without hesitation that the Act does not permit of any such set-off as suggested. It is difficult to see how the Court could have decided in any other sense. The Act provides for paying compensation in regard to the employment; and the only consideration affecting the basis upon which the amount is computed is the rate of wages. A man's dependents are those who must look to him for maintenance while he lives and has the right of disposing of whatever estate he may possess. He cannot divest himself of his legal responsibilities to his dependents; and the amount of his accumulations is as immaterial to his employer as it would be to anyone else against whom his dependents might have a lawful claim.

Another point brought before the same excellent Judge is as to whether the whole of certain premises is a factory within the meaning of the Act. This is a very important question indeed. Is the whole of a manufacturing or trading establishment a factory because some part of it unquestionably is so? In the case in point, a carman in the employment was loading timber in the public street outside the premises of his employers; and he fell, and was killed. Judgment has been reserved; but we have little doubt as to how it will go. A man who fell in a Manchester warehouse while going for tea for himself and a salesman during business hours has been held not to have been engaged in his lawful employment. An interesting case has been decided at the Southwark County Court. It applied to the question of "overside" labour in ship discharging; and the point raised was whether a labouring stevedore, working at a barge moored alongside a steamer moored to a quay, could be said to be working in a factory according to the meaning of the Act. The defence was that the Act was not intended to include operations between ships and barges. The extraordinary thing was the contention that, in these circumstances, one side of a ship would be within the meaning of the Act and the other not. The Judge decided that the applicant, working in a barge on the off-side of the ship, had not brought himself within the scope of the Act. The parties may appeal.

The First Workmen Directors.

THE announcement made elsewhere of the result of the voting of the South Metropolitan employees in the first election of Workmen Directors signalizes the commencement of a new era in gas-works administration. May the end fully justify the beginning! Messrs. Austin, of East

Greenwich, and Butcher, of the Old Kent Road, have the distinction of being the first Workmen Directors of any gas undertaking; and they will take their seats at the South Metropolitan Board to-morrow. We understand that there were 48 qualified workmen, under the Company's Act, distributed over the various stations. Preliminary voting for the selection of station candidates was only necessary at the Old Kent Road; because at the other stations not more than the one candidate offered himself for the suffrages of his co-workers. Thus there was nothing like a "rush" for the honour—and responsibility—of a seat at the Board. By a course of selection, the candidates were worn down to four, who were voted upon last Friday. Any of these would have been acceptable to the rest of the Board, and, indeed, there was little to choose between them; but on the whole it is considered by all parties that the most suitable men have been elected. It only remains to add that the workmen shareholders have taken a most active and intelligent interest in the voting—quite five-sixths of all the voters recording their votes. The general result is regarded as very satisfactory.

Technological Examinations.

THE report of the Examinations Department of the City and Guilds of London Institute for the past session has been issued. It claims that the work of the department has made good progress during the past year. The satisfactory relations established between the Institute and the Technical Education Committees of County Councils and various Trade Societies have been continued, "with the "result that the number of technical classes throughout "the country registered by the Institute shows a marked "increase, and the instruction is in closer touch with "industrial requirements." The latter effect was certainly well worth producing. It is only justice to here recognize the perseverance of the Examinations Department of the Institute in the endeavour to make their pass certificates and prizes of distinct market value. The Superintendent of the Technological Examinations (Sir Philip Magnus) is now of opinion that this point has been attained in the case of some branches. Thus it is recorded with pardonable pride that the Post Office have recognized the Institute's certificate in Telegraphy as qualifying the holder of it for increased remuneration. This official recognition has had the effect of nearly doubling the number of candidates for examination in the subject; and employers generally are asked to exert the same influence, "by "giving some kind of reward to such of their employés [*sic*] "as succeed in passing the Institute's examinations." The observation is just. What the Post Office can do, other employers can do even more easily; and it is quite conceivable, for example, that the announcement on the part of Gas Companies and Municipalities of their willingness to give a rise of salary to such of their young officers and workmen as can show the Institute's pass certificate, would greatly encourage the study of "Gas Manufacture." From the returns of the number of candidates in the different practical examinations, it may be inferred that the Institute is getting into closer touch with the trades; though much remains to be done in this respect. The proportion of failures to passes in the Ordinary Grade examinations is far too large in most subjects. Having regard to the simple character of the tests imposed, which ought not to daunt the most diffident individual actually engaged in the trade, it can only be inferred that the examinations are still merely the happy hunting-grounds of elementary school teachers desirous of providing themselves with as many certificates as possible.

The Examiner in Gas Manufacture (Mr. Alfred Colson) does not appear to be troubled with many of these outsiders. He reports that the examination is gaining in popularity, and that the quality of the candidates' papers is improving "all round." This is eminently reassuring. For, as the Examiner is careful to point out, a successful gas engineer is necessarily an all-round man. He must know something of chemistry, as well as engineering and building construction. Unfortunately, young men who get into gas-works through the laboratory or by way of the "shops" usually betray their early training much too conspicuously. The young chemist does not know anything at all about carbonizing work or valve connections; while the fitter is ignorant of what goes on in the apparatus which he knows how to put together. Still, Mr. Colson is able to say that this weakness is now being corrected. He complains, we regret to notice, that the "sketching" of his candidates is poor. This is a very sharp criticism that all gas engineering students should make a careful note of. Every aspirant for any engineering employment ought to remember that he can never be too well up in his work; but an engineer who cannot be trusted to indicate at a moment's notice, by a sketch, how a joint should be made or a structure put together, is literally fit for nothing in this line. It should never be forgotten that it is the engineer who makes the sketch, while it is only the draughtsman who makes a finished drawing. We should like to ask the Examiner in what sort of style the papers were composed; for good composition and clear treatment of the subject are half the battle as regards an engineering paper. One expects a gas engineering student to show a fair degree of general training. This is not a matter that an examiner in technology can take official cognizance of; but we may be sure that a candidate who was incapable of expressing his knowledge clearly and correctly would greatly disappoint the examiner. It is so important that students of science or technology should not confine themselves to these subjects!

Speaking recently at the Royal College of Science, Sir Norman Lockyer laid great stress upon the truth that "scientific studies gain enormously by the results of "literary culture, without which we can neither learn so "thoroughly nor teach so effectively as one could wish " . . . . To keep a proper mind-balance, engaged as "we are here continuously in scientific thought, literature "is essential, as essential as bodily exercise." It is more than ever important that this caution should be observed, now that type-writing has disestablished penmanship as a sign of general education.

A Trade Union Agent Punished.

A SALUTARY example was made in Dublin on Saturday of an agent of militant Trade Unionism. The Recorder had to dispose of a case in which a confectioner sought to recover damages for libel and slander perpetrated against him by a bill-poster and advertising contractor. The plaintiff had received a visit from a Trade Union official who threatened him for having discharged a workman; and as he persisted in managing his business in his own rather than in the Trade Union way, offensive handbills were distributed in the street opposite his shop by the defendant, presumably acting for the Union. Some difficulty appears to have been experienced in putting the law in motion; but when the defendant actually got into Court, he declared that he received the bills complained of from the Secretary of the Trade Society, and "knew "nothing of the case." Afterwards he apologized to the plaintiff; and he begged for mercy from the Recorder. The Court, however, took a serious view of the offence. The Recorder described it as a deliberate attempt on the part of the Trade Union, working by the defendant, to ruin the business of a respectable man, and to make his life as intolerable as malice could devise. "Anything more "calculated than the method adopted to bring a man into "hatred and contempt with an entire class, he could not "conceive; and if he had the gentry before him who "were the instigators of this document, he would give "the very largest sum that his jurisdiction enabled "him to give, in order to teach those people who, "he supposed, were upholders of the liberty of the "people, a lesson as to the difference between the "liberty of the freeman and the tyrannical license to "ruin one's neighbours." The defendant was then let off with 20 guineas damages, and a stern warning that were there a renewal of the acts complained of, the matter would be reported to the Attorney-General. The Recorder further expressed his opinion that if the men who were behind the defendant "had a single sentiment of honour," they would pay his fine for him. The constant tendency of Trade Unionism to break out into lawless acts is one of its besetting evils. The public need to be protected against this danger; and since Trade Unions are not responsible bodies, the only way of checking their lawlessness is to bring their agents to a sense of their personal liability for their actions. It should be no excuse for a man, but rather an aggravation of his offence, if it is shown that he acted on the instigation of an irresponsible society.

An Instructive Lamp Accident.

A GOOD example of the nonsense talked about the deadliness of low flash-point lamp oil was furnished at a recent London

inquest. Somebody upset a lighted lamp in a bedroom, and the clothes of the deceased, who was in the bed, caught fire. The victim was severely burnt, and subsequently died from the effects. An Inspector of the London County Council under the Petroleum Act attended the inquest, and is reported to have said that "the container of the lamp "was composed of extremely fragile glass, and the flashing-"point of the oil was 92°. The flashing-point recommended "by the Council was 105°." The Jury returned a verdict of "Accidental death," and added a rider that the flash-point of oil should be raised, and the sale of lamps with other than metal reservoirs stopped. It is to be observed that the report does not state that the lamp was broken. Assuming this to have been the case, however, is it really meant by the London County Council to be inferred that any material difference would have been noticed if the flash-point of the oil had been 105° instead of 92°? Not even the most fanatical partisan of Scotch oil who gave evidence before the Petroleum Commission would have committed himself to so absurd a contention. The accident in question really goes to stultify the action of the County Council; for supposing there to be superior safety in 105° oil as compared with 75° oil—at least an intelligible case, with a considerable margin of flash-point to go upon—how much ground is left for the presumption of safety at 105° and danger at 92°? This is, indeed, "cutting it fine." The recommendation to abolish glass containers is behind the times. This point has been settled, and there is no valid objection to glass containers, provided they are made strong enough. In this particular fatality, the trouble was evidently with the lamp, rather than with the oil; but so long as lamps are portable, they will occasionally be upset. If perfect safety from this class of accidents is desired, the fixed gas-burner is the "only wear."

WATER AND SANITARY AFFAIRS.

To-day the London County Council are expected to enter on the discussion of the report of the Water Committee, with its proposals for legislation in 1899. It is difficult to see, apart from the chapter of accidents, what practical result can accrue from these proceedings. The movement, if we may so term it, has all the weakness of a premature effort. There is an attempt to pluck fruit before it is ripe, and to forestall something which ought to be waited for. "The Times" declares it difficult to escape the conclusion that the Water Committee have been ambitious rather than discreet. The leading journal finishes its comment by saying that, even if the conclusions presented for acceptance should be agreed to by the Council, they are "hardly likely, "in the present state of the question, either to commend "themselves to the Government or to be adopted by the "Legislature." The recommendation of the Water Committee, that the Council shall promote a Bill for the purchase of the undertakings of the eight Metropolitan Water Companies, is met by an amendment, to be moved by the Earl of Onslow, that the proposal be referred back to the Committee, as Parliament cannot be expected to deal with the whole question of the London Water Supply pending a report of the Royal Commission which has been appointed to consider the subject. This is so obvious a consideration as to commend itself to the judgment of everyone who is not possessed with the wild notion promulgated by the "Daily Chronicle," that by proposing measures of their own the Council can compel the Government either to provide facilities for such Bills, or else to promote something which shall be equivalent. It would be extraordinary compulsion indeed that could lead the Government thus to pour contempt upon a Royal Commission which it had itself called into existence. Lord Onslow may very well propose, as he does in his amendment, that the preparation of a Bill for purchasing the undertakings shall be deferred, partly for the reason that the Council should wait to see how far they can harmonize their policy with the views of the Royal Commission. Parliament will undoubtedly wish to know what conclusions have been arrived at by the Commission before proceeding to discuss a scheme for handing over everything to the County Council.

The Earl of Onslow is conciliatory towards the Water Committee. They propose that the Purchase Bill shall contain a clause to enable the Council to proceed at an early date with the requisite works for connecting the eight systems of supply. Lord Onslow, while objecting to an immediate attempt at purchase, proposes that the Council shall promote a Bill providing that any Metropolitan Water Company may be required, in case of emergency, to supply water to any other such Company whose supply may be deficient. The Bill is to provide for connecting the reservoirs and mains of the several Companies, so as to facilitate arrangements for this purpose. Of course, this involves a remarkable interference with the ordinary operations of the Companies; and it may occur to legislators of a reasonable type, should the matter come before Parliament, that a less authoritative interference would be sufficient. So far as experience goes at present—and this is not likely to be exceeded—there is only one Company who are likely to need help from their neighbours, and that help has already been provided for. A question here presents itself as to the mode of "providing "for the connection of the reservoirs and mains." Is this operation to be superintended by the County Council? If not, the Council may become lukewarm in their promotion of a measure which may—in their apprehension—give increased value to the undertakings, and which will disarm one species of attack.

But the Finance Committee have something to say about the report of the Water Committee; and we always like to hear what the Finance Committee have to tell us. However, they have a very partial story to relate at present. Concerning the expenditure which would be incurred in carrying out the recommendations now before the Council, they are not prepared to add to what has already been given in evidence before Lord Llandaff's Commission or expressed in official reports. "Indeed," they say, "the "data for framing a trustworthy estimate of the cost of "purchase do not exist." So even Lord Llandaff must be in the dark; and it is no wonder that such should be the case, seeing that his information so far comes from the Council. "Trustworthy estimate" is a happy phrase. The Council are great in estimates; and we find that the Finance Committee are able, with the help of the Comptroller, to pile up a few figures on the subject, not of expenditure but income. It is reckoned—and Mr. Haward so told Lord Llandaff—that the authority purchasing the Water Companies would in 1901-2 enjoy a net income of £1,030,000. Lord Llandaff asked what was the amount of capital, the interest and sinking fund on which could be met by such a revenue. The Committee say this is "a "matter of simple calculation, dependent on rate of interest "and term of redemption." But the Committee do not present us with any such calculation, though they say: "By these data the Council may measure, to some extent, "the financial result which may follow from purchase."

Treating of additional supply, the Finance Committee say a large outlay within a comparatively short time is inevitable, whether the system adopted is that of storage or bringing a supply from a fresh source; and they signify that storage, though cheaper at first, may be the dearer plan in the end. How far off the end may be, they do not estimate; but they have "no hesitation in recommending" that the period of redemption, both for purchase and additional supply, should be fixed at a hundred years.

Hints on Painting Structural Ironwork.—Professor Alvain H. Sabin has published an essay on the painting of ironwork, basing his remarks on a notable example of the corrosion of an iron bridge carrying Washington Street, Boston, over the line of the Boston and Albany Railway. This bridge was erected in 1871, and is now completely worn out; the lower portion of the girders having been perforated and practically destroyed by the action of the exhaust gases and steam from the funnels of the locomotives running beneath. Painting, though done at frequent intervals, seemed to be quite ineffective in checking the mischief. Professor Sabin accordingly insists on the necessity of thoroughly cleaning all structural steel by pickling, by the sand blast, or by some equivalent means, if painting is to give good results. He points out that in electro-plating, enamelling, and the like, the greatest care is taken to chemically clean the surfaces treated. Paint should have something like the same chance of justifying itself. Also, as far as possible, favourable weather conditions should be chosen. Summer time is obviously the best season for this work. At other periods of the year moisture is liable to condense on the metal work, and prevent the proper adhesion of the paint. This tendency to the condensation of moisture may even be aggravated by the addition to the paint of benzine, or similar volatile medium, with the object of rendering it quick drying. The rapid evaporation of such fluids cools down the surrounding iron; and if the hygrometric state of the air is at all near the dew point, moisture may be condensed on the cooled surface before the painter's brush.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 989.)

THE course of movements on the Stock Exchange last week was extremely chequered. The opening was much depressed. Apprehension that hostilities with France could scarcely be avoided, and the fear that the Money Market was going to be exceedingly tight, had a very lowering effect. On Tuesday, things had reached their worst. The rush to sell knocked prices down rapidly; and Consols actually touched 106¾. Then a smart recovery set in. The scare about money was found to have been unwarrantably exaggerated, as is not unfrequently the case; and then the political outlook was regarded as brighter. A few buyers came forward, and prices recovered. Thenceforth to the close things remained steady and quiet; the markets just marking time. Demands for money for the Stock Exchange settlement were satisfied at advanced rates; and the market keeps strong. Business in the Gas Market seems to have gone to sleep entirely. Such a quiet time as has now ruled for some while past is probably unprecedented. The market might almost as well be closed without anyone suffering much inconvenience. Movements last week were very few and slight. As a matter of course, prices rather tended to give way where they had no support. In Gaslights, a few transactions were marked in the "A," at about middle figures—the opening and the closing prices being 291; and there were a couple of bargains in the secured issues which also gave no indication of a change. A little business was done in South Metropolitan, which was inclined to droop, and the quotation gave way accordingly. Commercials were quite unnoticed. The Suburban and Provincial group were as quiet as the rest. British was decidedly flat; but the quotation fell only slightly. The Continental Gas Companies were quite neglected. Imperial was done two or three times; but generally it seems to be awaiting further developments of the Vienna position. There were a few movements among the undertakings located in the remoter world. Cape Town receded a point, and Oriental half a point; but Buenos Ayres was fractionally higher. In the Water Companies, business was at a very low ebb. Prices were steady, and almost entirely unchanged. Lambeth is making another stride ahead, being about to join the small group of Companies paying something on account of back dividends unpaid. Kent is paying 4 per cent. on this account; Chelsea, ½ per cent.; and Lambeth will do the same.

The daily operations were of the smallest. On Monday nothing moved; but on Tuesday South Metropolitan receded 1½. On Wednesday, there was a fall of ½ in British, and ¼ in Oriental. On Thursday, Buenos Ayres improved ¼. In Water, Lambeth 7½ per cent. rose 1; but East London fell 2. On Friday, East London was put up again. A fall of 1 in Cape Town on Saturday closed the week.

ELECTRIC LIGHTING MEMORANDA.

A Newspaper Account of the Brighton Breakdown—Wanted, a Lantern—Making a Convenience of the Gas Supply.

A BRIGHTON newspaper has published an interesting, not to say amusing, account and explanation of the collapse of the Municipal electric lighting of the town, to which reference was made in this column last week. It is narrated how "a trifling accident" at the generating station "had the effect of throwing the whole town in darkness for a period of twenty minutes." Opinions differ; but if the magnitude of causes is to be gauged by their effects, we should not think this particular mishap could be properly described as "trifling." If, however, the cause of the collapse is underrated in this newspaper description, the consequence is unduly magnified; seeing that the Corporation electricity supply does not yet light the whole town. We imagine that the gas supply was maintained as usual during the eclipse of the municipalized illuminant; thus preserving the town from utter darkness. But to resume. The report states that the breakdown occurred at about five minutes past nine, when the dynamos were under their heaviest load. The machinery and dynamos at the works are all of the latest pattern, and, of course, "are fitted with appliances which should have rendered an incident like that of last night impossible." In some human concerns it is the impossible, as well as the unexpected, that always happens. In the present case, "the cessation of the light was caused by the heating and ignition of an armature, coupled with the failure of the automatic 'cut out' to perform its task of throwing the damaged dynamo out of the circuit." Just so. These armatures are ticklish things; and as for the automatic "cut out"—well, it must have been a bit behind-hand this time. The report continues, in the familiar strain, to tell how the officials and members of the Lighting Committee of the Corporation hurried to the spot. The reporter would consider himself seriously lacking in the performance of his duty if he were to omit a single name that could by any possibility be dragged in on such an occasion. In this case, the devoted officers and town councillors who distinguished themselves by hastening up to the works "to see what was the matter," lost their labour; for the works themselves were in "utter darkness, except for the glow of the furnaces." The Committee had scorned to keep a few gas-lights available for use at the station; and consequently it shared the fate of all the other consumers of the electricity supply.

When the fault had been groped out and the collapsed dynamo put out of circuit, it was by no means easy to make a fresh start with the others. All the load was waiting for them; and it was like starting an overloaded horse against a hill to get the current once more "whistling through the cables"—to use the reporter's picturesque language. After a time, however, all was right again; and, as the report allows, "the manner in which at night a totally unexpected emergency was met, and the unusual difficulty overcome, reflects great credit on the Electrical Engineer and his staff." One of these gentlemen must have been in possession of a box of wax matches, by the light of which he and the others could make their way to the switchboard and around the station—not a nice place to stumble about in the dark. Evidently, a lantern or two are useful adjuncts to an electricity generating station replete with all the latest improvements. Naturally, the Brighton public are assured that no fears of a recurrence of the mishap need be entertained. Nothing of the kind, it is asserted, has occurred before during the seven years that the Corporation have been carrying on the undertaking. The circumstances are declared to have been of an "unusual character"—in what respect? The armature of an overloaded dynamo will burn out at any time, and any number of times, under certain conditions. It is not to be supposed that the Electrical Engineer of the Brighton Corporation had any reason to suspect the existence of these conditions on the 21st ult.; nor will he ever know how far removed from a similar breakdown his plant is at a particular moment.

Judging from the newspaper report, Brighton was very much frightened at what happened at the electricity works. It was believed at first that a fire had broken out at the works, "and, indeed, the singular appearance of the generating station, with all the lights in front extinguished, and in the rear the red glow from the open mouths of the furnaces, the plunging roar of the dynamos, whirling in the semi-darkness, and the vast clouds of steam rising from the roof, appeared to give some confirmation of this story." It can easily be conceived how disgusted a partisan of electric lighting must be with the lurid language of this too graphic report. It is very inconsiderate to make so much of a "trifling accident." In the town, although a good deal of inconvenience was caused for a time, patience and a little gas helped to pass it over. "At the Pavilion a bazaar was in progress in the King's Apartments; and for the moment stallholders and visitors were in complete darkness. *Fortunately the gas-fittings still remain* in these rooms, and in the corridors and entrance hall; and these being quickly lighted, little inconvenience was caused." The italics are ours. If this is the kind of thing that happens after seven years of electricity supply, the gas-fittings are likely to "remain" in a good many places. We lay stress upon this feature of the Brighton mishap, in order that gas manufacturers, and those authorities who are responsible for public security, may not be caught napping. It is all very well for gas-fittings to be kept as a stand-by in public assembly rooms and elsewhere, in order that people may indulge in the luxury of electric lighting without fear of being caught in a dark trap in the event of anything going wrong at the works or with the distributing plant. It is obvious, however, that unless these gas-fittings are regularly looked after and occasionally used, their presence may inspire confidence which might be found misplaced. Attendants in the performance of the ordinary operations of dusting and cleaning are liable to knock unused fittings about without becoming aware of the mischief done. It is a good deal to expect gas-burners (say) at the Brighton Pavilion, to be instantly available for service years after the electric light had been installed in the building. We are not sure of how the burden of responsibility would rest in all cases of the kind, as between the suppliers of gas and those who harbour meters for occasional use. As a rule, the gas company's responsibility ends at the stopcock on the meter. It used to be considered that the suppliers of gas had nothing to do with whatever happened to the gas after this; but the judgment of the House of Lords in the famous Nine Elms case, opened out possibilities in this regard which have never yet been fully explored. Nobody has had occasion to travel farther into this country; but circumstances might arise to throw the burden of investigation upon any statutory gas undertaking of which a "convenience" is made by another interest.

Electrical Purification of Water.—At Blankenberghe, in Belgium, the water is purified by means of electricity. The water is drawn from the Bruges Canal. After filtration, it goes into a storage reservoir, whence it is pumped into the sterilizers—electric machines of 1000 volts. It is then ready for distribution.

Lowering Large Gas-Globes for Cleaning.—Messrs. Falk, Stadelmann, and Co., Limited, have devised a rod for lowering with safety the globes of their "Veritas" gas arc lanterns for cleaning purposes. It is attached to the lantern by means of a hook, a pin and chain being placed inside the tube; and the globe will slide down and may be turned round or tilted without fear of breakage.

MECHANICAL TRAMWAY TRACTION.

FIRST ARTICLE.

IN our Electric Lighting Memoranda last week, mention was made of a report upon tramway traction furnished by Mr. J. Allen Baker to the London County Council, and ordered by the Council to be printed for sale as one of their official publications. This report is very well worthy of attentive study by everybody interested in any way in the problem of mechanical tramway traction. It is hardly necessary to explain how the subject touches the interests that are bound up in the gas industry; but the fact of gas power traction having been put forward as a possible solution of the problem is only one consideration in point. A still more considerable matter in this connection is the electrolytic effects that have so far proved inseparable from the system of electrical tramway working most generally used—the single overhead trolley-wire system. The weighty observations in this regard of Dr. J. A. Fleming, at the recent meeting of the British Association (*ante*, p. 689), supply ample reason why gas engineers should follow the current developments of tramway practice, with the object of securing the integrity of their distributing plant against unnecessary and preventible injury.

This is, shortly, how the matter stands: Tramway authorities everywhere are being pressed to improve their services by introducing some form of mechanical traction. The only real question remaining to be answered in this regard is: What system should be adopted to supersede the obsolescent horse haulage? The great mass of electrical engineering opinion answers—the single overhead trolley-wire system, as adopted to an enormous extent in America, and now being introduced into certain Continental and British towns. Many electricians affect to laugh to scorn any suggestion that this is an objectionable system. The two leading English electrical journals—both remarkably well conducted and authoritative publications—take this view. They definitely accept the proposition that whosoever says mechanical traction for tramways means electrical traction, and that electrical traction means the single overhead trolley wire. In the "Electrician" of the 21st ult., there is an expression of hope that the conditional withdrawal of the opposition of the London County Council to the overhead trolley will mean the introduction of the "thin end of a wedge which, when driven completely home, shall signalize the adoption of electric traction throughout the London tramway systems." This journal jeers slightly at Mr. Baker's report as favouring a conduit system; remarking that "when they see the prices they would have to pay for conduits, the ever public-spirited London County Council will advocate the trolley system after all." Similarly, the "Electrical Review" of the same date lays stress upon the evidence that "of 204 (tramway) companies in Europe, 173 employ the overhead system;" and it argues fairly enough of this system that, while nobody claims perfection for it, "the method which is going to supersede it has to convince the army of practical men who have been responsible for the 30,000 miles of overhead trolley which exists to-day."

We trust it will not be esteemed disrespectful to these 30,000 miles of trolley wire, if we venture to observe that the supreme test of any system of tramway working must still be its admissibility to the streets of London. This is the crucial point; and the London County Council are deserving of the strongest commendation for insisting upon the rejection of all proffered proofs, presuming that what is good enough for anywhere is good enough for London. The very fact of certain imperfections being admitted, is tantamount to an admission that London is asked to put up with some drawbacks for the sake of obtaining some degree of benefit; and it is obvious that the Metropolitan conditions are peculiarly severe upon both drawbacks and advantages. The evidence of the 30,000 miles of overhead trolley wire is that electrical traction upon this principle is somewhere able to supersede horse haulage on its merits. But it does not prove that the system, with all its concomitants, is suitable for adoption as a solution of the problem of improved tramway working for London. The advantages of the system are cheap and rapid tramway working, yielding a fair profit. The drawbacks are disfigurement of the thoroughfare, obstruction by the overhead wires and posts, injury to gas and water pipes—all to be summed up in the one word, an "imperfect" system. The absolute and relative importance of these various considerations naturally differs for different localities. The case of London in this regard is not to be measured by analogy. Put as briefly as possible, London wants every possible benefit, without the slightest drawback, to say nothing of positive danger. Only to mention one kind of consideration here—the one with which we are naturally most concerned—what counterbalancing advantage could compensate for the liability of the gas and water mains and services in a main London thoroughfare to destruction by electrolysis?

It is not specially our province to defend the cause of street amenity from the overhead trolley wire; but it is very remarkable that every illustration of the installation of the system published in the electrical journals, or in Mr. Baker's report, only serves to show how complete and hopeless is the disfigurement by the overhead wires of thoroughfares having any pretension to elegance. Of course, one can shut one's eyes to them after a time, and endeavour to ignore them, as in the case of the "sky-sign" and the monstrous advertisements of soaps and pickles. But they are there all the same; and they utterly spoil a street vista. It is sometimes argued that the supports of the overhead wires can be made useful in another way, to carry electric arc lamps; but the first objects to be lit by the lamps are the very wires and tackle which everybody would prefer to have left in the dark. There are in Mr. Baker's report many illustrations of this disfigurement of town thoroughfares. Of the obstruction of the roadways by the overhead trolley system, it is superfluous to speak. The system could only have originated where telegraph and telephone networks are permitted to be carried at a low level through the streets, instead of over the house-tops, as in England.

It is time, however, to return to the consideration of Mr. Baker's report as a storehouse of information respecting the "forms of mechanical tramway traction that have been tried, and more or less successfully worked, in various towns and cities in England, on the continent of Europe, and in America." The author admits to notice mechanical motors for tramway traction operated by "steam, oil, gas, compressed air, cable, and electricity." The steam trams are "out of the race," and consequently need not be discussed. Oil motors are neither successful nor popular. With regard to gas motors, Mr. Baker refers to the examples of Dresden, Dessau, and Blackpool. He admits that the last-named installation has numerous improvements over the original German systems, and appears to work economically. "The expense of running per car mile is stated to be 4½d.—a cost which compares favourably with other systems of traction." The system of working the gas-power cars is described. The cars will run nine miles for every charge of compressed gas. Mr. Baker says "the engine requires to be kept working continually, even when the car is at rest; the gear connecting to the axle being thrown in and out by the driver. Supplemental gearing, to give greater power at slower speed, is provided to ascend gradients. But even with this provision, although the steepest gradient on the Blackpool line is 1 in 26, the laden cars have sometimes difficulty in surmounting it; and if a stop is made half-way up, the car needs to go back and recommence the ascent." This is a question of gearing. Mr. Baker enumerates as the advantages of this system that each car is self-contained, and no overhead or underground wires are necessary. A well-constructed horse tram-line could be used with these motors without alteration further than installing the necessary gas-compressing stations, pipe connections, &c.

The disadvantages enumerated are: "Considerable vibration of the cars, occasional smell of gas from engines, difficulty in ascending gradients, and the periodical stoppage for recharging the gas cylinders. This must be done at the compressing station or a sub-station to which the compressed gas could be conveyed through a system of underground pipes." The most damaging thing Mr. Baker can say of the gas tramcar, however, is that the deputations from the Birmingham and Sheffield Corporations who examined the system, "reported unfavourably as to its adoption in those cities." This he seems to think conclusive. We venture to observe that he is mistaken. More will be heard of the gas-power tramcar before it is definitely classified. Our "Correspondence" columns to-day bear witness to the existence of another aspect of the matter. It would be a dangerous doctrine to admit the unfavourable opinion of a Corporation deputation as settling any question. The British Gas Traction Company may or may not have been as enterprising as the nature of their circumstances permitted; but they have done, and are doing, more to improve their system and extend its operation than Mr. Baker states. If the gas-power tramcar is the cheapest mechanical means of working a tramway now before the world, both to instal and to operate; if it is a self-contained arrangement, capable of being put in service at any hour of the day or night; if the cars will run as fast as the Board of Trade regulations permit—then the system must have a future, in London as well as in the Provinces. There is no necessary connection between the use of gas power for propulsion and excessive vibration of the car. Cars can be built to ascend all gradients; and the necessity for stopping to re-charge occasionally is no real hindrance. Of course, if people start out prepared to see no good in anything but electricity, they will come back convinced of the wisdom of their prejudice; but those who are prepared to regard the problem of mechanical tramway working as still an open one, will be well advised to suspend judgment as to gas traction until they know more than Mr. Baker can tell them about it.

THE WATER ACTS OF 1898.

(*Continued from p.* 915.)

The following Acts of Parliament confer additional powers upon statutory Water Companies:—

The Brompton, Chatham, Gillingham, and Rochester Water Act authorizes the construction by the Company of new works, including a pumping-station at or near the Headley Well, at Luton, and a service reservoir at Woolman's Wood. A footpath is to be diverted. Clauses for the protection of the War Department are inserted, one of which requires all pipes to be buried to a depth of at least 30 inches. The Company are to pay the

Secretary of State £3 a year for wayleave. Certain lands are to be compulsorily acquired; and the works constructed thereon are to be completed in five years. The area of supply is extended to include the parish of St. Margaret Extra. The rates chargeable for domestic supplies are set out in detail, and are referred to rateable value instead of annual value, as provided by the Company's Act of 1860. New capital to the amount of £60,000 is authorized, with increased borrowing powers. The register of a meter is to be *primâ facie* evidence of the quantity of water consumed; and any dispute as to the quantity is to be referred to a Court of Summary Jurisdiction, whose decision is to be final and binding upon all parties. Fittings may be removed from any houses left unoccupied for three months; and meter supplies may be cut off if unused for 48 hours. Demands under £50 may be recovered through the County Court.

The Cranbrook District Water Act extends the limits of supply to several parishes named in Kent and Sussex. These powers are to be acted upon within eighteen months. Clauses are inserted for the protection of the borough of Tenterden, by which the Corporation may acquire possession of the undertaking in the borough in the event of the Company not fulfilling their engagements to furnish a sufficient and constant supply. New works are authorized, comprising wells and pumping-stations at Goudhurst, Rolvenden, and Hawkhurst, to be completed within seven years. New capital to the amount of £36,000 is authorized, with the usual borrowing powers. So much of the South Kent Water Act 1889 as authorizes the South Kent Company to supply water within the limits of this Act is repealed.

The Folkestone Water Act extends the Company's limits of supply to four neighbouring parishes. The powers are to be exercised within seven years. New works are authorized, including a pumping-station at Lydden, and another at Hawkinge. The works are to be completed within ten years. The Company are to give a constant supply from and after the beginning of 1901, when the mains are to be kept charged with pure and wholesome water, sufficient for the domestic use of the inhabitants, at a pressure to command the top storey of the highest houses erected or to be erected within the area of supply, subject to the limit of 300 feet above Ordnance datum. Water is to be supplied by meter at the maximum price of 1s. 6d. per 1000 gallons, and 1s. per 1000 gallons for public purposes. The Earl of Radnor having granted to the Company facilities for obtaining an additional supply of water, clauses are enacted for the protection of the Radnor Settled Estates. The charge for domestic supplies is not to exceed 7 per cent. upon the rateable value. New capital to the amount of £200,000 may be raised, with the usual borrowing powers.

The Hartlepool Gas and Water Act sanctions the construction of an impounding reservoir upon Amerston Beck, at Crookfoot or Quaker Gill, and another similar work upon Dalton Beck at "the Howls." The water from these reservoirs is not to be supplied for domestic purposes. Whenever the Company have occasion to supplement the supply of water for other than domestic purposes by the addition thereto of water which they would otherwise supply for domestic purposes, they must notify the Corporations of the two Hartlepools at least 24 hours in advance. The discharge of compensation water is provided for. The works are to be completed within ten years. Additional water capital to the amount of £80,000 is authorized, not more than £50,000 of which may be issued as preference capital. The usual borrowing powers were conferred.

The Higham and Hundred of Hoo Water (Amendment) Act provides that section 4 of the Company's Act of 1890 shall be amended; and the Company are bound to make use of their powers to supply certain parishes within eighteen months. The rate of interest payable on consumers' deposits is reduced to 4 per cent.

The City of Norwich Water-Works Act authorizes the issue of new capital to the amount of £60,000, to bear 6 per cent. ordinary or 5 per cent. preference dividend, and carry the usual borrowing powers. Section 44 of the Water-Works Clauses Act, 1847, is amended by dispensing with the owner's consent. Additional works are to be constructed within ten years, comprising a subsiding tank and filter-beds to be formed on lands adjacent to the Heigham pumping-station of the Company, and a service tank at Mousehold.

The Newcastle and Gateshead Water-Works Act enables the Company to issue new 5 per cent. capital to the amount of £480,000, with the usual proportion of loan. Additional works are to be constructed, chiefly pipe-lines and tramroads. For the protection of the Newcastle-upon-Tyne and Gateshead Gas Company, certain clauses relating to the pipe-laying are enacted. The new works are to be completed within seven years. The authorized tramroads may be worked by "mechanical" power, which is defined as meaning any motive power other than electrical and animal power. The time limited by the Act of 1894 for the completion of a certain pipe-line is extended to July 3, 1904.

The Southend Water-Works Act sanctions the raising of £176,000 of new capital, to bear a 5 per cent. ordinary or preference dividend, and carrying the usual borrowing powers. Additional works are authorized, comprising a well and pumping-station in the parish of Fobbing, others in the parish of Vange, and another in the parish of Bowers Gifford. Lands are to be acquired compulsorily within five years; and the works are to be completed within fifteen years. From and after the construction of the works and the taking of water from the parishes of Bowers Gifford or Vange, the Company are to supply the Billericay Rural District Council with sufficient water for the use of the inhabitants of Bowers Gifford, Pitsea, and Vange; such supply being calculated on a basis of not less than 4 gallons nor more than 18 gallons per head per diem during the months of April to September inclusive, and not less than 4 gallons nor more than 15 gallons per head per diem from October to March inclusive. But the summer supply is not to exceed the quantity required during the succeeding winter season by more than 20 per cent. The supply is to be paid for, whether the quantity required is actually taken or not, at the price of 1s. 6d. per 1000 gallons. The same conditions are attached to the taking of water from Fobbing; the Orsett Rural District Council being the Local Authority acting for the inhabitants of the parishes of Fobbing and Langdon Hills.

The Southwark and Vauxhall Water Act authorizes the construction of additional works for water taken from the River Thames, in the parishes of Walton and West Molesey. Clauses are inserted for the protection of other London Water Companies, and of the Thames Conservancy. Power is given for the abstraction of water from the River Thames, under certain conditions and upon recited terms. Additional debenture stock to the amount of £650,000 is authorized, redeemable after 25 years. A sinking fund is to be formed in a specified manner. The capital value of the Company's undertaking is not to be increased by the passing of the Act.

The Staines Reservoirs Act amends in certain respects the Act of 1896. It sanctions the construction of larger reservoirs than the works authorized by the Act of 1896, and permits the diversion of a road in Hanworth. The works are to be completed within seven years. It is provided that if the Penton Hook Weir is constructed, water shall not be drawn from the Thames when it is flowing over that weir at a rate per day of 24 hours of less than 300 million gallons. The nominal amount of Staines Reservoirs Guaranteed Debenture Stock may be increased to £1,250,000. Trustees are enabled to invest in this stock.

The following Acts deal with the transfer of water undertakings from Companies to Local Authorities:—

The Felixstowe and Walton Water Act authorizes the Urban District Council to purchase the undertaking of the Company, who obtained an Act in 1895, in which preliminary provision for the purchase was made in the usual way. The Act sanctions the transfer at a price to be ascertained by arbitration under the Lands Clauses Acts, if the proceedings are carried through within six months. The Council are to give an effective supply to the outlying parts of the district within five years.

The Filey Water and Gas Act authorizes the Urban District Council to supply water and to acquire the undertaking of the Company, who obtained their first Water Act in 1856. The amount of the purchase-money has been agreed upon, and is named in the Act. The rate for domestic supplies is 10 per cent. on the rateable value. Meter supplies are to be charged 2s. per 1000 gallons. Right of entry upon consumers' premises is given, between the hours of nine and five, for the purpose of preventing waste of water or removing unused fittings. The water loan is repayable in fifty years.

The Forres Water Act enables the Corporation to purchase the undertaking of a Limited Company formed in 1845, upon the terms of a scheduled agreement. New works are authorized, including the conversion of Loch Romach into a storage reservoir, and an intake on the Black Burn in the parish of Rafford. On completion of the new works, the existing intake on the Black Burn is to be discontinued. All sporting rights on the lake are reserved to the landlord. The rate for domestic supplies is to be 1s. 6d. in the pound of the annual rack rent of the full annual value. A loan of £18,000 is sanctioned.

The Heywood Water-Works (Transfer) Act establishes a Joint Board for the water supply of Heywood and Middleton, and vests in the Board the existing undertaking of the Heywood Corporation. The terms of the transfer are stated in a schedule. The time prescribed by the existing Acts for the construction of certain authorized works is extended to seven years from the passing of this Act. The sum of £55,000 may be borrowed for the works, besides £10,000 for strengthening the embankment of the Nayden higher reservoir.

The Kettering Water Act authorizes the purchase of the undertaking upon six months' notice, for a sum to be ascertained by arbitration under the Lands Clauses Acts. The rates for domestic supplies range from 8 to 7 per cent., with the higher rate for all inns. The sum of £16,500 is to be borrowed for improving the works.

The Liskeard Corporation Act provides for the purchase of the Company's undertaking upon terms set out in detail. Rates for domestic supplies are to range from 8 to 6 per cent.

The Maldon Water Act incorporates the Company, and authorizes the transfer of their undertaking to the Corporation, according to the terms of a scheduled agreement. The existing debenture debt of the Company remains as a first charge upon the property. The works comprise two pumping-stations and wells; and a new water-tower is to be constructed. Rates for domestic supplies range from 1s. 6d. to 1s. 2d. in the pound. Prices are stated for meter supplies. A water purchase loan of

not exceeding £20,000 is sanctioned, with £10,000 for improving the works.

The Matlock Urban District Council Act authorizes the Urban District Council to acquire the undertaking of the local Company, who obtained their first Act in 1860. The transfer is in accordance with the terms of a scheduled agreement. The water-works are to be improved by the construction of an impounding reservoir upon the Bentley Brook, from which compensation water is to be discharged at the rate of 209,560 gallons per day. Rates for domestic supplies range from 10 to 6 per cent. Prices are stated for meter supplies. The works are to be completed within ten years. A clause is inserted for the prevention of plumbism. A water-works improvement loan of £48,000 is sanctioned.

The Newtown Water Act provides for the transfer of the undertaking to the Urban District Council of Newtown and Llanllwchaiarn. The price is to be ascertained by arbitration, which is also to allow for £300 of parliamentary expenses, and compensation to the Clerk of the Company. Rates for domestic supplies range from 8 to 6 per cent. The sum of £10,000 is to be raised for improving the works.

PERSONAL.

Mr. T. H. Alderson, Assistant-Manager at the Halifax Gas-Works, has been appointed Gas Manager to the Selby District Council, in succession to the late Mr. W. J. Mott.

Mr. W. Mackie, Engineer and Manager of the Port-Glasgow Gas-Works, has received an honorarium of £20 for extra services rendered by him in connection with the telescoping of a gasholder.

OBITUARY.

Mr. J. Brigden, of Church Cobham, who until a few years ago was Chairman of the Cobham Gas Company, died on Friday, the 21st ult., at the advanced age of 81.

The death is announced of Mr. John Reay Forster, who for many years was Resident Engineer to the Newcastle and Gateshead Water Company. In his youth he served his apprenticeship with Messrs. Morrison at the Ouseburn Engine-Works. He afterwards became Engineer for the Cramlington Coal Company, and next officiated in a similar capacity for a colliery company in South Wales. Having been there some time, he secured the important appointment in Newcastle which he held for nearly 35 years. About a fortnight ago, he caught a chill, which terminated fatally on the 21st ult. The deceased gentleman, who was 77 years of age, was not only greatly admired for his ability as an Engineer, but was also very much respected for his kindly disposition.

We regret to learn that, at an early hour last Tuesday, Mr. Wilson John Mott, Gas Manager to the Selby Urban District Council, succumbed to an attack of brain fever, accelerated by influenza. Deceased, who was only 38 years of age, was highly esteemed at Selby, to which place he went in April last to take charge of the gas-works on the removal of Mr. Dunn to Goole. Deceased leaves a widow and four children. The funeral took place on Friday, at Stockton-on-Tees. At the meeting of the District Council the same day, the Chairman (Mr. T. Liversedge) referred in high terms to Mr. Mott's efficiency as a manager; and a resolution was passed expressing sympathy with Mrs. Mott in her great bereavement. A public subscription has been started on her behalf; and the Chairman and two members of the Council have each contributed £5 thereto.

Developments in the Commercial Uses of Gas as a Fuel.—As the pioneer in the development of the commercial use of gas as a fuel, it is only natural that Mr. Thomas Fletcher, of Warrington, should direct the attention of its suppliers to any extension in this direction. He takes as an example the singeing of cotton fabrics; and it is interesting to learn from him that coal gas now plays an important part in producing the finished material, as compared with the time when charcoal and coke fires were used, as they still are by some who are behind the times. For singeing the loose "fluff" of wide sheetings, a gas-burner giving a perfectly equal flame 7 ft. 6 in. long is required; and the higher the temperature obtained, the more work can be done by one machine. As the machines are very costly, and take up a great deal of room, speed is of the utmost importance. A burner giving a perfectly equal flame 7 ft. 6 in. long and of a high temperature requires a gas consumption of 800 to 900 cubic feet per hour. Scores of these are in use; and if gas managers were to look after their interests hundreds would be employed instead of scores. A burner consuming the above-named quantity of gas for eight or ten hours daily for 313 days per annum is worth considering. That such burners are made, and used, and repeatedly ordered, is a simple fact. The profit is a very small matter to the maker of the burners, but it is not to the makers of the gas. Mr. Fletcher says this is by no means the largest example of the kind, and the sooner that gas companies see their power the better. It is quite certain that no user would consume 800 to 900 cubic feet of gas per hour without showing a profit; and this profit goes to the gas-maker.

NOTES.

Liquor Ammonia as a Fire Extinguisher.

A French writer in a pharmaceutial journal has once more made the suggestion that "aqua ammonia" should be kept for extinguishing fires in workshops and factories where highly inflammable substances are stored or used. Referring to a fire which occurred at Savenay, France, the writer states that the vapour from a tank containing 50 gallons of gasoline caught fire in the linen-room of a laundry. The room was instantly a mass of flames; but 1½ gallons of liquor ammonia thrown into it, completely and almost instantaneously extinguished the fire. The ammonia was in a carboy in a druggist's shop next door to the laundry; and the druggist, who was naturally interested in preventing the fire from spreading, threw it into the room by way of experiment. According to his own graphic description, the effect was instantaneous—torrents of black smoke rolled upward in place of the flames, and in a moment every trace of fire was gone. So completely was the fire extinguished that workmen were enabled to enter the room almost immediately, when they found the iron tank of gasoline intact. Anything that will quell the flame of burning petroleum spirit is worth knowing. Some years ago, it was the practice to place glass jars of liquor ammonia upon the vessels containing gasoline in store, with the object of their being broken and liberating the ammonia in the event of any explosion. It would be interesting to know if this practice is still followed.

A Test of Good Mortar.

In 1892, Mr. J. Hughes contributed to the "Builder" the result of some observations upon the character of certain ancient mortars, from which he deduced the important conclusion that the higher the proportion of amorphous or gelatinous silica soluble in alkali, the better the quality of the mortar. And as this kind of silica is associated originally with the lime rather than with the sand, it becomes a serious point that the character and composition of any lime intended to be used for mortar should be inquired into, and the best quality selected. Mr. H. F. Hills corroborates this conclusion, from an examination of the mortar used in building the chancel wall of Bow Church, in East London, which dates from 1480-90. The results of Mr. Hills' analysis of this mortar are given in a recent issue of the "Builder." The stone employed with the mortar was Kentish ragstone. The proportions of sand and lime used were probably one of sand to one of lime; and the wall is in excellent condition. In contrast with this ancient mortar, was a sample of grout, or mortar, believed to be about 150 years old, taken from another part of the same building. This mortar could easily be broken up and crumbled in the hands. It had been made of a mixture of gravel and lime, in the proportion of about three of gravel and one of quicklime. The proportion of silica soluble in a 10 per cent. solution of caustic soda (Mr. Hughes's test) was very low; being only about 2 per cent., as compared with over 8 per cent. in the good mortar.

Calcium Nitride and the Fixation of Atmospheric Nitrogen.

M. Moissan has communicated to the "Comptes Rendus" an account of his experiments in connection with the preparation of calcium nitride, some results of which bear upon the remarks of Sir W. Crookes at the British Association meeting concerning the fixation of atmospheric nitrogen. Starting with pure crystallized calcium, prepared according to a method previously described by M. Moissan, it is easy to prepare calcium nitride by the direct combination of the two elements at a suitable temperature. In the cold, nitrogen and calcium do not act upon each other. But on gently heating them, in contact with one another, a slow absorption takes place. The white metal takes on a bronze-yellow tint, due to the presence of the nitride. If the temperature is raised to a low red, the calcium catches fire, and burns in the nitrogen, with a very rapid absorption of the gas. The reaction is best carried out in a nickel tube. At the temperature of the electric furnace, the nitride is completely decomposed by carbon; calcium carbide remaining in the tube. Water decomposes the nitride with violence; ammonia and calcium hydrate being formed. Hence the suggestion is offered that this substance, calcium nitride, may find a commercial application in the formation of ammonia from atmospheric nitrogen. The various stages of this process are not further explained; and no attempt is made to estimate the cost of working, as Sir W. Crookes did in the course of his British Association address.

Protective Metallic Coatings for Iron and Steel.

The above-named subject was dealt with in a paper read by Mr. Sherard Cowper-Coles, at the meeting of the Society of Engineers on the 3rd inst. The author directed attention to the comparative corrodibility of iron and steel under varying conditions, and emphasized the importance of the subject, now that steel, which corrodes more rapidly than iron, is so largely used in construction. He gave some interesting examples of failures in engineering structures owing to rapid corrosion. Sea water dissolves iron quickly, and acts upon it more powerfully than upon steel. Raw tar has a very marked effect upon wrought iron. The author cited the case which had come under the notice of Mr. Carulla, of Derby, in which some bolts, fixed

in valve-boxes, had been badly pitted. Particulars of this case were given in the "JOURNAL" about two years ago. The boxes were used for pumping water which had been contaminated with tar residues, and which smelt strongly of naphthalene. Up to the present time, zinc has been found to be the most effective coating, due to the electro-chemical action set up between the steel and zinc. A short history of the galvanizing industry was given, together with details of the improvements introduced from time to time. The author explained the best working conditions for electro-zincing, and gave a comparison of the actual and theoretical weight of zinc obtained for a given amount of electrical energy. He drew attention to cadmium and copper as protective coatings for iron and steel, and set forth their advantages and disadvantages compared with those of zinc.

The Transmission of Heat through Iron.

A curious example of the mysteriousness that often hangs about common phenomena, is described in a letter to "Nature" from Mr. John Stone Stone, of Boston, Mass. The writer states that about the year 1880 he had occasion to heat one end of an iron bar to a bright red, while holding the cooler end in his hand. Upon plunging the heated end into a bucket of water, the cooler end became suddenly so hot that he was obliged to drop it. The beginning of the experience in question is in the common way of blacksmith's work; but we cannot remember having seen the consequential circumstance noticed anywhere. The phenomenon of the heat of the iron being driven along the bar in this manner interested Mr. Stone very much; and eight years later, while working in the physical laboratory at Johns Hopkins University, he further investigated the matter. He arranged an iron or steel bar, to be heated at one end by a compound bunsen burner, which made the iron red hot. To the other end of the bar was soldered a thermo-electric couple, the circuit of which was closed through a sensitive reflecting galvanometer, with precautions against radiation and convection effects. The spot of light on the galvanometric scale was adjusted to a convenient point, when the state of steady flow of heat along the bar was established. Then the bunsen flame was removed, and water was immediately poured over the end of the bar. The spot of light on the galvanometer scale immediately moved off in the direction indicating a rise of temperature at the cooler end of the bar. The rapidity of the action was another source of surprise to the observer, as it far exceeded in velocity the propagation of heat along the bar by conduction. Later experiments with brass bars failed to show the same effect, from which Mr. Stone concluded that the effect was due to much the same cause as recalescence. It is remarkable that an effect which must so often have been produced and observed by workers in iron has not been discussed.

Practical Hints on Linseed Oil Paints.

The "Ironmonger," which has this year devoted much space to the discussion of paints and varnishes, speaks well of oxygenated linseed oil, as a modern improvement on the old plan of boiling the oil. Not much difference is made in the nature of linseed oil by boiling it, except that its viscosity is increased thereby; and this enables the medium to retain in a proper state of mixture the heavier pigments used for preservative painting. If instead of boiling the oil—which means subjecting it to a temperature of 300° C.—it is agitated with oxygen at ordinary steam heats, the operation of bringing it to the desired consistency is much expedited, the oil gains in weight instead of losing, does not darken much nor become appreciably fluorescent, and finally dries more rapidly. At first the oxygen process was open to some objections; but recent samples are credited with strong drying powers, and the production of an admirably tough and elastic film. Experience must dictate judgment on the behaviour of mixed paints under the brush and when drying. The drying of linseed oil paint is affected by a number of external circumstances. Cold and damp retard it greatly; want of light is just as detrimental. For these reasons, it is unpractical to insist upon a paint drying in a certain number of hours. The actual speed of drying is of less importance than the character of the dried film. Many cheap paints, sold ready-mixed, drag strongly on the brush, showing that they are overloaded with driers; and they accordingly dry with great rapidity, yielding an excessively thin brittle skin, highly suggestive of rosin oil, while the body of the coat remains wet for a long time afterwards. One of the best and most severe tests for linseed oil is to apply it to a plate of glass or metal, allow it to dry, and then try the film with the finger. The same test is applicable to all paints and varnishes. As soon as the surface is no longer sticky to the touch, the finger should be dragged across the film. If it cracks instantly and a lot of apparently unaltered paint or varnish oozes out, the material should be rejected. If the skin is tough and requires some force to tear it, while the underneath portion appears to have already become nearly dry, it can safely be concluded that the sample is good and fit for any kind of employment. Another simple test is steaming. A slip of clean sheet iron is painted two coats, and laid paint downwards, after the coats have dried hard, over a pan of boiling water. It is kept in this position for several hours, and the film afterwards removed by soaking in aniline. If the iron has not rusted, the paint or varnish may be considered reasonably waterproof.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

A HASTY conclusion drawn by the Committee of the above Association from altogether insufficient evidence was, as will be seen by the report below, responsible for the placing of Mr. W. S. M'Gregor, of Longton, and the "JOURNAL" in a false position before the members at their meeting last Thursday. The matter is referred to in our editorial columns to-day; but, in justice to Mr. M'Gregor, we consider it a duty to accord to it some fuller explanation in conjunction with the report of what transpired at the meeting. It appears that some months since Mr. M'Gregor promised to contribute to the proceedings of the Association a paper describing the new plant and improvements at the Longton Gas-Works. In the meantime, however, the Corporation Gas Committee resolved to have a formal inauguration of the new works, and to celebrate the occasion by a little festivity. The date chosen by the Gas Committee (*not* by Mr. M'Gregor) as the most convenient for the event was Oct. 20—just a week before the meeting of the Association at which Mr. M'Gregor was to read his paper. By invitation of the Chairman of the Gas Committee and one of the Contractors, a representative of the "JOURNAL" attended the function at Longton for the purpose of recording in these columns an account of what was being done there in the way of developing the concern. As is usual on such occasions, he, as well as the other visitors, was handed a printed pamphlet briefly describing the new plant; and by the aid of this, his own observations, and some notes he made, he prepared the article which, in the ordinary course of things, was published in our last Tuesday's issue. The pamphlet, by the way, was the production of one of the contractors. Therefore, how by any stretch of the imagination Mr. M'Gregor could be held accountable for the article passes comprehension. But (for reasons which will be obvious on reading the report of what took place at the meeting of the Association) we wish to emphasize these further points: At the time our representative left Longton on Friday, the 21st ult., Mr. M'Gregor had not written the paper for the meeting of the Association; on that day the article which appeared in the "JOURNAL" was written; it was put in type the next day; the "JOURNAL" containing it was printed during Monday night; and it was not until the following (Tuesday) morning that the manuscript for Mr. M'Gregor's paper was delivered at the "JOURNAL" office, in order that slips might be prepared for use at the meeting of the Association. Consequently, until Mr. M'Gregor received his copy of the "JOURNAL" on Wednesday morning last, he could not have had any knowledge of the line the writer of the article had taken; nor until after the "JOURNAL" was printed did the writer of the article know anything as to the character of Mr. M'Gregor's paper. After perusing the article, Mr. M'Gregor suggested in a letter to the Honorary Secretary (we believe in view of the proposed visit to the Saltley works) that the time of the meeting might be saved by taking his paper as read. The letter was laid before the Committee shortly before the ordinary meeting of the members on Thursday; and, without knowing the facts of the matter so far as the "JOURNAL" was concerned, and without having had an opportunity of making a comparison of the article and paper, the Committee decided to take the extreme course of rejecting the latter altogether. Later in the day, however—after the above facts had been brought to the notice of various members of the Committee—some reparation was made by the revocation of this decision, and the admission of the paper as part of the transactions of the Association. But the injury had then been inflicted.

The Autumn Meeting of the above-named Association was held last Thursday at the Grand Hotel, Birmingham, under the presidency of Mr. J. T. LEWIS, of Wellingborough. There were more than fifty members present; this being a record number for the past few years. The members generally observed with gratification that the President now looks none the worse for the accident which befel him during the visit of the Association to Wellingborough in May last.

CONFIRMATION OF MINUTES.

The HON. SECRETARY (Mr. Charles Meiklejohn, of Rugby) read the minutes of the meeting held at Wellingborough; and they were confirmed.

ELECTION OF OFFICE-BEARERS.

The PRESIDENT said it gave him great pleasure to propose, as President for next year, their esteemed friend, Mr. J. S. Reeves, of Bilston. He was one of the members who had done a great deal for the furtherance of the interests of the Association—as a member of the Committee, as an Auditor, and for some period as Honorary Secretary. He (the President) was sure that the nomination of Mr. Reeves for the highest office in the Association would meet with hearty approval, seeing that in him they had a man who was qualified in every way to preserve the traditions of the Association.

Mr. B. W. SMITH (Smethwick) had pleasure in seconding the

motion, and in endorsing the remarks made by the President. Mr. Reeves had been associated with them for many years; and he had been a steady-going, hard worker.

The motion having been unanimously adopted,

Mr. Reeves thanked the members for the honour they had done him. He trusted that, with the help the members were always willing to afford their President, he would be able to perform the duties of the office to their satisfaction.

Mr. P. Simpson (Rugby) said he had to introduce a name for the vice-presidency which he was certain would be received with the honour due to it. It was that of Mr. J. F. Bell, of Stafford. He was a man who had worked hard in the profession, and who had done much good.

Mr. T. Berridge (Leamington) seconded the motion, which was unanimously passed.

Mr. Bell, in thanking the members for his election, promised to try to discharge the duties to their satisfaction. With Mr. Reeves as President, they would not require much aid from him (Mr. Bell); but he would be happy to give any assistance he could.

Mr. W. Belton (Shrewsbury) said the proposition he had to make would be a popular one. It was the re-election of Mr. Peter Simpson as Treasurer. No one knew better than the members the valuable services Mr. Simpson had rendered to the Association from its foundation—in fact, he had rendered numerous services to the gas profession before then. He (Mr. Belton) believed he was one among the first few who founded the original parent Association.

Mr. C. Taylor (Derby) having seconded the motion, and endorsed the remarks of the proposer, it was agreed to.

Mr. Simpson thanked the members; remarking that there was nothing that gave him greater pleasure than to be able to do something for the Association and profession. He was one of the first who arranged meetings of gas managers. He felt the need of them then very much, not being far up the ladder, and wishing to be up. (Laughter.) He considered at that time, as he did now, that one of the best things for the profession was for friends to meet together to discuss matters that would be beneficial to them; and it gave him much pleasure to see the progress that had been made. He thanked the members for the honour they still paid him; and he hoped to see the finish of another year in their service as Treasurer.

Mr. T. Glover (West Bromwich) proposed that Mr. Meiklejohn be asked to continue in the office of Honorary Secretary. He believed Mr. Meiklejohn was willing to serve; and the members would be delighted to know this, because they had had a long experience now of the genial way in which he conducted the work of the office.

Mr. W. R. Cooper (Banbury) seconded the motion, which was heartily adopted.

Mr. Meiklejohn briefly thanked the members for the confidence they showed in him by his re-election. Proceeding, he proposed that Mr. W. Winstanley (Newcastle-under-Lyme) and Mr. H. P. Maybury (Great Malvern) be appointed members of the Committee in the place of Messrs. Parlby and Meunier, who retired by rotation.

Mr. Reeves seconded the motion, which was passed.

The election of Mr. Maybury to the Committee rendered vacant his position as one of the Auditors; and Mr. Berridge was appointed to succeed him, to act in conjunction with Mr. P. Winstanley, of Nuneaton.

The next item on the *agenda* was a paper by Mr. W. S. M'Gregor (Longton) on

The Reconstruction of the Longton Gas-Works.

The Hon. Secretary stated that the previous morning he received a letter from Mr. M'Gregor, suggesting that his paper should be taken as read, on account of the fact that it had been already to some extent, or largely, anticipated in the publication of an account of the opening of the new works at Longton. He (Mr. Meiklejohn) did not know what the feeling of the meeting might be on the matter; but he simply wished to say that this was the first intimation he had had that any of the information regarding the extensions that Mr. M'Gregor promised him some time ago for a paper would be published before being brought before the Association. It had placed him and the Committee in rather an awkward position.

The President said the Committee were much surprised to find that Mr. M'Gregor's paper* was published in the "Journal" the previous Tuesday—only two days before the meeting. It seemed strange that this publication should have taken place, because the paper was promised a considerable time since for this meeting. Consequently, the Committee felt that, because the paper was practically the same as the "paper" in the "Journal," they could not accept it for publication in the transactions of the Association. The Committee regretted this; but it must be so. They felt most strongly that, if a paper was promised by a member, that promise should be held sacred. So far as the purport of the paper was concerned, nothing whatever should be published until the paper was read at a meeting of the Association. It was open to the members to say if they were satisfied or not with the action of the Committee. He should be glad to hear any explanation Mr. M'Gregor had to offer.

Mr. J. F. Bell (Stafford) suggested that Mr. M'Gregor should offer an explanation before any discussion took place.

Mr. M'Gregor said he was sorry this had occurred. The opening day for the works was not fixed by himself. It was originally intended that it should have been that day [the 27th]; but it so happened that the date was inconvenient. It did not occur to him that the "Journal" would be able to get their article in type and published before the meeting. He was very sorry that this had offended the Committee. There had not been the slightest idea of anything of the kind on his part. He had no doubt the Committee were quite within their rights in the course they had taken; but he need not say more as that was pretty well the whole explanation.

Mr. Bell: Cannot Mr. M'Gregor give us some details that are not published in the "Journal?"

The President: The brakes to convey the members to the Saltley Gas-Works have been ordered here earlier on account of the decision of the Committee.

The Hon. Secretary said that, anticipating the paper would be taken as read, he had arranged for the char-a-bancs to be at the hotel at 2.30. If they had not left until three o'clock it would have given them only a short time at the works before darkness set in.

[Mr. M'Gregor did not accompany the members to Saltley; and, before leaving, we understand he intimated that, in consequence of what had happened, he should resign his membership of the Association.]

The Saltley Gas-Works Extensions.

Mounting the conveyances, the members at once proceeded to the Saltley Gas-Works to view the extensions in progress in connection with the large extension scheme. They were received with the greatest cordiality by the Engineer (Mr. Henry Hack, M.Inst.C.E.), who, having conducted them into a temporary structure at the entrance to the new works, prefaced the inspection by explaining to them, in a general way, the character of the work in hand and that in prospect. Only a fortnight since, we described the scheme of extension at some length, to which account there is at present little to add. It might, however, be mentioned that the finishing work in connection with the enlargement of No. 5 holder is being rapidly advanced by Messrs. Westwood and Wrights; and Messrs. C. & W. Walker are also making tremendous strides in the construction of the 8¼ million cubic feet holder, which, as we have already shown, contains several features of interest. It was seen that, in the past two or three weeks, the contractors have put into position nearly the whole of the inner lift, and one-half the first lengths of the standards; and almost the whole of the top curb is in segments on the ground ready for fixing. In this holder, Messrs. Walker have adopted a method of construction which greatly facilitates the progress of the work; and, indeed, we do not think it has ever been attempted before on such a large scale. The sides of the lifts are being delivered in large segments already riveted; and these have to be simply lowered in position, and riveted together. Each piece is about 7 feet wide, and the full depth of the holder, with the vertical guides and the stays inside and out riveted on.

Mr. Hack was assisted in guiding the members round the works by Mr. Morrison and other assistants. Having completed their survey of the storage extensions, and of the preparations which are being made for the carrying out of further sections of the scheme, and having also inspected the water-gas plant, the visitors were kindly invited by Mr. Hack to take tea in the temporary building in which they had previously been welcomed.

A Retractation.

The members having finished tea,

The President said he desired to take this opportunity of making a few remarks with reference to the paper which Mr. M'Gregor had prepared for the meeting. Since the members left the Grand Hotel, he and several others had received an explanation which had put the matter in a different light. He was pleased to say this, because to him (the President) and to the Committee it was most distasteful to say or do anything that might seem to be in the slightest degree unjust to anybody. He found that the facts of the case were somewhat as follows: The representative of the "Journal" was present at the opening of the new works at Longton by invitation; and while there he used his opportunities as a journalist—and rightly so—to get all the information he could about the works and the alterations that had been made. In preparing his article, he doubtless did not know the purport of the paper that was to be prepared by Mr. M'Gregor and given to the Association at their meeting that day, nor that the article would practically cover the description which the paper would give of the reconstruction of the Longton Gas-Works. If they had had these facts before them that afternoon, he thought that, at any rate, the members would have allowed the paper to be taken as read. He considered, in justice to Mr. M'Gregor and to the "Journal," this explanation should be made; and, on behalf of the Committee, he begged to propose—"That the paper prepared by Mr. M'Gregor should become part of the transactions of the Association."

* A comparison of the article that appeared in last Tuesday's issue with the paper prepared by Mr. M'Gregor will show that the President was utterly mistaken in describing the article as the "paper." It will be seen that at least two-thirds of the article consists of altogether different matter to anything appearing in the paper given on the opposite page.

Mr. J. S. REEVES (Bilston), in seconding the motion, said that, after the lucid remarks made by the President, he had little to add, excepting this: In deference to the wishes of his Committee Mr. M'Gregor prepared an illustrated statement setting forth the nature of the extensions for the use of his Committee and such persons as were interested in them at the opening of the new works, and this statement was to form the ground or basis of the paper he was to read. As Mr. M'Gregor explained at the meeting, he expected that the opening of the extensions would have taken place on that [last Thursday] or a subsequent day; and then the Association would have had the description before them previous to any portion of it being published. But it was thought desirable to begin working the new plant earlier; and, of course, Mr. M'Gregor had to consider his Committee before the Association. He (Mr. Reeves) thought it would appear to the members, under these circumstances, that they would be doing right in reversing the decision arrived at at the meeting. They did not wish to do an injustice to anyone; and after the explanation that had been given, they would be doing Mr. M'Gregor an injustice, and giving him pain, by not rescinding the previous resolution.

Without further remark, the motion was unanimously carried.

THANKS TO MR. HACK—THE DEVELOPMENT OF THE SALTLEY WORKS.

The PRESIDENT said his next duty was to propose, on behalf of the members, a vote of thanks to Mr. Hack for his great kindness to them that day. It was not the first time by many that they had had the privilege of looking over the works controlled by Mr. Hack. Many were the times that he (the President) remembered the members had been there, and had been shown whatever was to be seen in the way of extensions; and he need not point out how extremely valuable these opportunities were to them all. He was sure they had all been interested and instructed very much in looking over the tremendous extensions now in progress. They had indeed seen some fine examples of engineering skill and construction. He sincerely thanked Mr. Hack for showing them the new works, and for his generous hospitality.

Mr. HENRY WOODALL, in seconding, remarked that they had known Mr. Hack for a great many years; and he had always shown great kindness in assisting the Association. They one and all hoped that he would live long to be a light among them, to show them the way they should go. Whatever they wanted to see in the way of gas-works, they could see in its best form under Mr. Hack's engineership.

The motion was carried by acclamation.

Mr. HACK said he was much obliged to the members for the vote of thanks they had accorded him. It had been that day, as in the past, a great pleasure to do what he could to serve the interests of the Association. He was always glad to see his *confrères* in the profession at the Saltley works—whether he had anything in the way of extensive works in hand or at other times. He felt that he was only reciprocating the many kindnesses he had received when visiting other works. In visiting each other's works, they learnt some things at one place and some at another; and so often gained a useful wrinkle. What the members had seen that day, must have impressed them that the Corporation Gas Committee and their Engineers—Mr. Hunt and himself—had no misgivings as to the future of gas lighting. Notwithstanding that the Corporation had recently taken over the electric lighting works, the great progress of the gas undertaking had forced upon them these extensions. Although they had acquired the electricity supply, they did not foresee anything that was going to deter the progress of gas; and they believed it would continue to move forward as in the past. In order to show the great advancement that had been made, he might mention that the production of gas had increased by no less than 118 per cent. since the transfer of the works to the Corporation in 1875. The make of gas in that year was 2,327,596,000 cubic feet; while in the past financial year it was 5,074,865,000 feet. And this, notwithstanding that several of the out-districts—Oldbury, West Bromwich, Tipton, and Smethwick—had severed themselves from Birmingham. If they had not done so, the increase would have been a great deal more. Even since the electric light was started in the city in 1891-2, the increase in the make of gas had been to the tune of 25 per cent. In 1891-2, the make was 4,045,006,000 cubic feet; and in the past year, 5,074,865,000 cubic feet. In his opinion, both gas and electricity would run alongside for many years to come; and they need not fear that gas undertakings were in, or likely to fall into, a moribund condition. In connection with the present extensions of the gas-works, it might be interesting to the members to learn that, at the time of the transfer, the greatest daily make at Saltley was 4,817,000 cubic feet; while in the past financial year, it was 11,906,000 cubic feet. The present daily capacity was: Coal gas, 10,250,000 cubic feet; and water gas (with plant in reserve), 3,250,000 cubic feet—making a total of 13,500,000 cubic feet. Adding to this the capacity of the extensions on hand—coal gas 5,000,000 cubic feet, and water gas 2,000,000 cubic feet—made 20,500,000 feet. Then when the scheme was completed, a further 5,000,000 feet of coal gas would have been added—giving Saltley a daily capacity of 25,500,000 cubic feet. There was no doubt the gas industry would go on prospering; and certainly in the lifetime of those present they would not be able to call it a decaying industry.

The PRESIDENT also proposed a vote of thanks to Mr. Hack's assistants for their attention during the tour of the works.

Mr. B. W. SMITH (Smethwick) seconded the proposition; and it was unanimously passed.

Mr. MORRISON, in responding, said he was sure it had been a pleasure to him and the other assistants to show the members of the Association round the works; but, while they were giving them this vote of thanks, he should like to mention that the assistants rather felt they were not of them. Some years ago it was decided that assistants of large works such as these should not be admitted to membership of the Association—the Association would not have them. At the same time, he thanked them for the kind vote just passed.

Mr. HACK observed that he hoped at some future time, as the works progressed in connection with the retort-house and purifying plant, they would again have the pleasure of seeing the members of the Association at Saltley.

The PRESIDENT assured Mr. Hack that the members would be delighted to pay him another visit.

Shortly afterwards, the company returned by the brakes to the Grand Hotel, where they dispersed.

The following is the paper Mr. M'GREGOR had prepared for presentation to the meeting:—

RECONSTRUCTION OF THE LONGTON CORPORATION GAS-WORKS.

It may be stated at the outset that the design, manipulation, and control of all mechanical appliances introduced into gas-works, has now become a subject of the greatest economic importance; and the majority of gas engineers, in designing modern works, arrange for their introduction with a view to economy and less dependence upon skilled labour, besides the greater facilities obtained for handling material—objects to be all the more strongly borne in mind in view of the Workmen's Compensation Act, and its probable demands upon employers. Gas making has changed but little during the last fifty years—*i.e.*, the principle remains the same, although many improvements have been made for carrying on the process. Still, as it is the aim of every engineer to produce the greatest quantity of gas from a ton of coal at the smallest cost for wear and tear, fuel, and labour (due consideration, of course, being given to the quality of gas supplied), this principle has to a great extent guided the writer in designing and carrying out labour-saving appliances during the reconstruction of the Longton Corporation Gas-Works.

The new retort-house is 90 ft. 6 in. long by 70 ft. wide between walls, and 35 ft. 6 in. from ground level to wall-plate. It is a plain but substantial building of two floors—the basement and working floor—presenting a massive appearance, quite in keeping with the work for which it is designed. The basement or cellar floor is used for discharging and cooling the coke, and attending to the furnaces. From the basement floor, access is had to the underground engine-rooms, where a 10-horse power engine of the vertical type is used to drive the coal breaking, elevating, and conveying machinery. The walls are lined with white glazed bricks; and these, of course, give a cheerful and cleanly appearance to the engine-rooms.

The working floor is carried on heavy steel girders, supported on cast-iron columns and steel joists with brickwork arches. In fact, throughout the whole of the work steel has entered largely into the construction, owing to its superior qualities of lightness and strength. It is rather unusual to design a house of this size with two floors. The reason that this type of house was adopted was that a large drainage culvert passes directly across the site, about 4 feet below the yard level; and as this precluded the building of a cellar for the regenerator retort settings introduced, it was finally decided to build a stage-floor house, which, although somewhat more expensive in first cost, soon repays the outlay, owing to the greater facilities obtained thereby for handling the coke. The retort-house is spanned by a light steel roof, the main principals being 72 feet long, with a rise of 17 ft. 6 in. A ventilator 10 feet wide, running the whole length of the roof, provides ample space for the exit of smoke, steam, &c. The total weight of the steel used in building the roof is just under 31 tons; and it is noteworthy that not a single forging has been required in fixing the roof. The retort settings are arranged for the introduction of mechanical stoking (manual), and are also designed with all the latest modern improvements of hydraulic main, gas and tar valves, flushing apparatus, &c.

As space would not permit of the erection of coal-stores on each side of the retort-house—nor, indeed, would the capital invested pay for interest and sinking fund charges on stores, owing to the works being situated so close to the North Staffordshire coal-fields—it became a problem how to obtain the best results in "coal trimming," as a large portion of the saving is effected in this direction. It was finally decided to construct two elevator and coal-breaker pits directly underneath the railway lines running along each side of the retort-house; each pit to contain steam-engine, coal-breaker, and elevator, into which the coal is delivered by means of bottom doors in the railway trucks. The elevators each deliver into storage hoppers of 7 tons capacity, fixed in the retort-house; so that either elevator can feed both sides, thus minimizing the chance of a breakdown. The coal is shunted in from the railway sidings; the waggons being run directly over the receiving hoppers. As

all the trucks are provided with bottom doors, little difficulty is experienced in emptying the waggons; while with hopper-waggons, built specially for this traffic, hand labour is reduced to a minimum. The receiving hoppers over the coal-breakers are provided with adjustable doors, so that the supply of coal to the breakers can be regulated according to the size or quantity required. The breakers are driven by a separate steam-engine of the vertical type, which also drives the elevator and conveyor. The elevators consist of 12-inch steel buckets, spaced 18-inch centres, fitted to a strong detachable link chain of cast steel, provided with lugs for fastening bolts and sliding gear; and the buckets are guided by a latticed steel framing, bolted on H steel girders built into the retort-house walls. These elevators are driven by belt and chain gear combined. The belt drive is adopted for the purpose of preventing any damage being done should a piece of iron or other foreign material find its way into the coal-breaker; the belt having a tendency to slip immediately this occurs. After leaving the elevators, the coal is delivered into an overhead storage-hopper or conveyor, as required. The conveyor consists of a flat cotton band, kept taut by means of rollers; and it is so arranged that it can be driven by either elevator or overhead hoppers.

The drawing-machine is of the usual rake type, mounted on a triangular frame running on rails in front of the charging-machine, and parallel to the retort-bench. The charging-machine consists principally of a moveable hopper carrying about 3 tons of coal, and fixed on an upright frame running on rails in front of the bench, and, like the drawing-machine, parallel thereto. The charging-machine is provided with steel travelling wheels, cast malleable travelling gear, and rope hoisting gear for raising and lowering the adjustable hoppers to the three tiers of retorts.

For disposing of the coke, moveable wrought-iron plates are fitted in front of the retort-bench immediately over the coke-shoots, delivering the coke into side tip-waggons placed underneath. The coke-shoots are carried on brackets bolted to the buckstaves, and are made V shaped to allow of the men having free access to the clinkering doors. For conveying the coke to the yard, a narrow gauge tramway, 20-inch gauge, is laid down; and side tip-waggons of 25 cubic feet capacity are used. These waggons will ultimately be hauled out and in by means of an endless rope, although at present they are being worked by hand. For quenching the coke, water-pipes provided with a rose are placed one over each coke-shoot, and also a water-tank of 500 gallons capacity over each line of tram outside in the yard. It is intended that the coke, after being thoroughly cooled, should be tipped into the boot of a coke elevating and breaking machine, broken to size, elevated, screened, and delivered into trucks, or the smaller sizes washed for smiths' use.

The exhausting plant has been completely remodelled; a new engine and exhauster of 50,000 cubic feet per hour capacity having been fixed, and the two existing exhausters coupled up to one engine direct—thus doing away with belt driving. The new exhauster is of the four-blade type; and the engine is controlled by gas and steam governors. A new rotary washer-scrubber, driven by a horizontal steam-engine, has been erected, and is capable of removing the ammonia and other impurities from 1 million cubic feet of gas per 24 hours, and will certainly repay the outlay in the increased yield of residuals. A new station meter has been built, of 50,000 cubic feet per hour capacity, and is erected in an outwardly plain but substantial building, although some little taste has been displayed in the interior decorations, notably the roof, which is stained and varnished. A cabinet of scientific instruments for recording illuminating power and pressure, together with the regulator for controlling the supply of gas to the borough, and a petroleum enrichment plant, make this one of the most interesting places in the works. A new leading main has been laid from the works to the Town Hall, and a new trunk main joined thereon to increase the supply to Dresden and district.

Another very interesting feature in the works is a small electric light plant, with which the purifying-shed, the governor-house, engine-room, offices, and Manager's rooms are lighted. It is a continuous current dynamo run at 110 volts; and is capable of supplying sixty 16-candle power incandescent lamps, and has already proved itself eminently useful in enabling purifiers to be attended to at night, in case of breakdown.

The extensions have cost about £15,000; and the writer considers the money has been well and judiciously expended, and trusts his brief *resumé* may prove interesting to the members.

Mr. H. Fowler on Calcium Carbide and Acetylene.—At a meeting of the Great Western Railway Engineering Society on Monday evening last week, Mr. H. Fowler, Gas Manager at the Horwich works of the Lancashire and Yorkshire Railway Company, read a paper on "Calcium Carbide and Acetylene." The author described the various types of furnace used for producing carbide, and gave the yield as about 0·3 lb. per electrical horse-power-hour. The cost of the electrical horse-power-hour per annum (24 hours per day) was stated as £4 at Foyers and £1 9s. at Geneva, as contrasted with the figure given by Professor Kennedy, when coal and steam were used in place of water power—viz., £9. The burners most suitable for the economical combustion of acetylene were described, as were also the numerous types of portable generators.

COMBUSTION IN RETORT FURNACES.

The following is an abstract translation of an article on the above subject in the "Journal für Gasbeleuchtung," by Dr. Otto Pfeiffer, of the Magdeburg Gas-Works.

The great advantage of gaseous firing of retort settings, &c., lies in the power it gives of securing combustion, which, according to theory, is approximately perfect. When perfect combustion takes place, the products contain neither an excess of atmospheric oxygen nor a remnant of unconsumed fuel gas. The heat which the fuel is capable of producing is thus set free in the smallest space in which the gases can be contained; and this again is consistent with the production of the highest possible temperature. The temperature attainable from the combustion may be expressed as the quotient of the heat of combustion of the fuel gas, divided by the specific heat of the products of combustion.

In gas manufacture the highest temperature is required; and therefore attention must be directed to the proper combustion of the fuel gas. That is to say, there should be neither deficiency nor excess of air, so that what may be termed "neutral combustion" takes place in the combustion chamber itself, and in any case is not extended far into the flues. The experienced man is able, from various indications, to draw conclusions as to the state and position of the combustion which is taking place. In the first place, the temperatures prevailing in the arch of the setting and in the flues are judged by the eye, and excess of air, which depresses the temperatures, is thus detected. Deficient combustion can also be traced from the blue flame of carbonic oxide and the great heat prevailing in the flues. Chemists have also the assistance of gas analysis to enable them to form a much more precise opinion on what is happening in the furnace; and a knowledge of the composition of the products of combustion further shows exactly to what extent the conditions deviate from those which afford neutral combustion. Observations of the temperature and draught are also valuable. It would, however, be wrong to assess the value of a setting, or to pronounce final judgment on its working from the results of one or even a couple of the methods of observation named, though this is very commonly done in gas-works, and a false opinion is thus frequently formed. Only on observation of what takes place in the setting throughout a protracted period of use can a reliable criticism be based; for the conditions frequently change from hour to hour, and at one time air, and a little later fuel gas, may be in excess. The extent of the mean deviation from the condition in which neutral combustion occurs is the only safe criterion of the working of a setting.

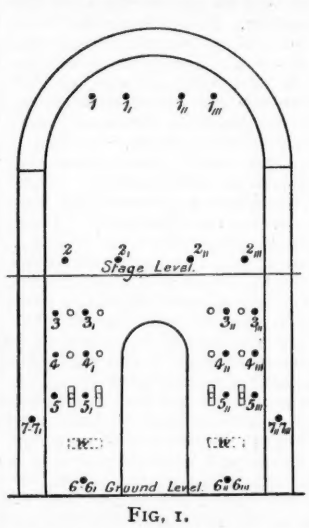

FIG. 1.

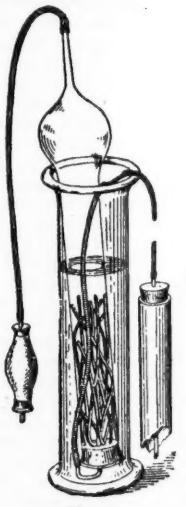

FIG. 2.

In the above diagram (fig. 1) is shown the back wall of a Klönne setting, furnished with test-holes for observing the course of the combustion in the setting throughout a period of 24 hours. Prior to the observations, of which the results are given below, the setting had been in use for about a year; but it was working normally at the time of the observations. The holes indicated by black marks (●) in the figure, open into the flues for the products of combustion. These flues run from top to bottom, as indicated by the numbers 1 to 7, 1_I to 7_I, &c. Each vertical series of numbers pertains to one stream of gases. Each horizontal series of similar numbers (1, 1_I, 1_{II}, 1_{III}; 2, 2_I, 2_{II}, 2_{III}, &c.) represents a zone in which the same phase of combustion is occurring in all the flues. In zones 5 to 3, commencing at the lowest, and lying between the flues, are the secondary air passages indicated by rings (O). The primary air enters above the water-pans (*w*). The furnace gases, on reaching zone 1 at the top of the arch of the setting, are forced back by a wall parallel to the back of the setting vertically downwards to zone 2, where they pass round the lower tier of retorts. The spent-gas flues proper commence at zone 3. They first traverse the whole depth of the setting from front to

back, but do not then follow the zig-zag course which is adopted in most other systems of regeneration. The flues which form one vertical series through zones 3, 4, and 5 communicate by three orifices, so that the spent gases pass directly downwards from zone 3. The two vertical series of flues on each side of the generator meet above the primary air passage, and follow a zig-zag curve at the back of the water-pan to the bottom zone 6, whence the gases ascend to the main flue 7. The secondary air passages, however, take a zig-zag course; each flue commencing in zone 5 at the back, passing to the front at zone 4, and again to the back at zone 3.

Observations were made at zone 2, where the gases passed from the combustion chamber to the flues. Samples of gas were taken at 2_1; and the temperature was read on a Le Chatelier pyrometer at the corresponding hole 2_2. The carbonic oxide was estimated by absorption by cuprous chloride. From the following tabulated results of the observations during 24 hours, it appears that the working was tolerably uniform and good, except during a few hours about noontime, when the percentage of carbonic oxide in the gases rose as high as 8·7. At this time, one-fourth to one-third of the producer gas was passing unconsumed into the flues, and a lowering of the temperature was apparent. The working of the setting, however, must be considered normal, as the combustion in the underlying flues of the small excess of carbonic oxide which passed out of the combustion chamber not only served to vaporize water in the pans between zones 5 and 6, but sufficiently maintained the heat of the spent gases which otherwise would have been unduly cooled through unavoidable leakages of cold air through the walls of the flues. The sudden increase in the amount of carbonic oxide in the spent gases above the small desirable amount, was due to an accumulation of clinker on the grate, which diminished the supply of primary air. The removal of the clinker caused the supply of primary air to be so great that more producer gas was formed during the ensuing hour than the fixed supply of secondary air was capable of consuming. After clinkering, the primary air should have been decreased or the secondary air increased, in order to attain the highest degree of economy; but such frequent regulation is impracticable in actual working of the furnace.

Time of Day.	Temperature.	Analyses of the Gaseous Products of Combustion. (Volumes per Cent.)		
	Degrees Centigrade.	Carbonic Acid.	Carbonic Oxide.	Oxygen.
6.0 p.m.	1080	17·2	3·4	Nil.
7.30 ,,	1085	18·4	2·0	,,
9 0 ,,	1090	18·6	1·7	,,
10.45 ,,	1070	18·4	2·0	,,
12.0 night	1075	18·2	2·6	,,
1.30 a.m.	1080	18·4	1·7	,,
3.0 ,,	1070	18·5	1·9	,,
4.30 ,,	1070	19·1	1·0	,,
6.0 ,,	1080	19·6	—	,,
7.30 ,,	1070	16·6	1·9	,,
9.0 ,,	1070	15·3	8 7	,,
10.30 ,,	1070	17·0	5·2	,,
12.0 noon	1065	15·8	7·1	,,
1.30 p.m.	1055	16·4	5·1	,,
3.0 ,,	1070	18·0	1·6	,,
4.30 ,,	1060	17·7	3·7	,,
6.0 ,,	1090	17·8	2·8	,,

The excess of carbonic oxide disappears as the gas passes on through the flues, and the condition of neutral combustion is sooner or later attained—the quicker, the less combustible gas was initially present. The neutral zone is thus sometimes higher, sometimes lower; but its position serves as a criterion of the working of the furnace at the moment, and, if continually watched, of the change of position of the point where combustion is completed. In order to ascertain the position of the zone of neutral combustion, samples of gas were taken at all the holes in one series of flues (1, to 7,) approximately at the same time, and were analyzed. The combustible portion of the sample was analyzed by combustion over palladianized asbestos, after admixture with excess of air. An analysis of the producer gas conducted over mercury by this method showed the following percentages of components: Carbonic acid, 8·8; carbonic oxide, 24·3; hydrogen, 17·6; and nitrogen (by difference), 49·3. The percentage composition of the samples of gas taken at the different zones in one series of flues is shown in the following table, whence it will be seen that, in the case in question, the neutral zone was between zones 3 and 4:—

Zone.	Carbonic Acid.	Carbonic Oxide.	Hydrogen.	Oxygen.
1	17·4	3·4	?	nil
2	18·0	2·6	1·4	,,
3	18·0	2·9	1·6	,,
4	18·2	nil	nil	0·2
5	16·6	,,	,,	3·7
6	9·0	,,	,,	11·4
7	8·4	,,	,,	11 8

In order to locate the neutral zone, it is not necessary that a complete analysis of the samples of gas should be made. It is sufficient to pass on from the upper to the lower zones until oxygen is detected in a sample; and the zone where this first occurs is just past the place of neutral combustion.

Such a qualitative examination of the samples of gas may be very simply and rapidly made by means of the apparatus shown in the preceding illustration (fig. 2). Within a drying tube about 12 inches in length, are placed sticks of yellow phosphorus, which extend about half way up the tube. The wide mouth of the tube is closed by a bung, through which one limb of a U-tube passes. The contracted end of the drying tube is connected with an enema pump. The tube is placed in a cylinder of water from which it is withdrawn in order to attach the free limb of the U-tube by flexible tubing to the porcelain tube by which the samples of gas are collected from the flues. The porcelain tube is first inserted in one of the upper holes, and the gas is aspirated through the apparatus by means of the pump. It is drawn in rapidly at first, in order to expel other gas from the apparatus; but subsequently it is drawn through slowly. No change will be observed so long as the unconsumed gases are in excess, except that a slight vapour, which soon disappears, forms when the aspiration is commenced. The zones are then examined in order from the topmost downwards by means of this apparatus. The time occupied in making each examination will not exceed two minutes. When the first zone in which an excess of oxygen is present is examined, the phosphorous will form a dense white cloud of phosphoric acid as soon as the gases come in contact with it. The zone of neutral combustion which was to be located lies between the zone at which this phenomenon is first observed and the one immediately above it.

The simple apparatus described not only permits of the zone of neutral combustion being rapidly located, but it also affords a means of shifting this zone to any desired position. Thus if combustion of the fuel gas is required to be completed in the combustion chamber itself, then the neutral zone should lie between 2 and 3. A sample of gas from hole 3 is drawn through the apparatus in the manner described above, while the secondary air inlet is gradually opened more and more until the cloud of phosphoric acid begins to appear. A movement of a few tenths of an inch in the position of the regulating slide of the air-inlet, causes the cloud to vanish or re-appear; and a movement of less than 4 inches will cause the position of neutral combustion to be transferred from one zone to the next. The test is sufficiently delicate to permit of an excess of 0·2 per cent. of oxygen in the gases being readily detected. In order to show the practical utility of the test, the position of the neutral zone, which, from the results of the analyses tabulated above, was between zones 3 and 4, was changed according to the indications of the phosphorus test until it was between zones 2 and 3. Samples of the gases were then withdrawn from the series of holes 1 to 7, and on examination showed the following percentages of the various components:—

Zone.	Carbonic Acid.	Carbonic Oxide.	Hydrogen.	Oxygen.
1	18 5	2·7	1·4	nil
2	19·4	0 6	0·3	,,
3	19·3	nil	nil	0·3
4	18·4	,,	,,	0·6
5	14·0	,,	,,	6·4
6	7·2	,,	,,	13·0
7	7·2	,,	,,	13·2

This quantitative analysis of the samples of gas, therefore, substantiated the correctness of the qualitative test with phosphorus.

To obtain exact results, it is desirable to repeat each test at the corresponding hole on the opposite side of the generator; but if the setting is carefully constructed, and the air-inlets on the two sides of the generator are opened precisely to the same extent, this precaution may be dispensed with. The change in position referred to above of the neutral zone from between 3 and 4 to between 2 and 3, should be attended by an increase in temperature of the setting and a decrease in temperature of the spent gases. Such changes of temperature were actually observed in the case in question. Thus, the temperature at 2, rose, subject to fluctuations, from 1100° C. (2012° Fahr.) to 1195° C. (2183° Fahr.); while the temperature in the main-flue fell from 700° C. (1292° Fahr.) to 620° C. (1148° Fahr.). At hole 1, the change was from 1180° C. (2156° Fahr.) to 1305° C. (2381° Fahr.). Nearly two days elapsed, however, before the full effect of the change of conditions was observed.

In conclusion, it may be remarked that the customary examination of retort furnaces by occasional testing of samples of the spent gases has a very restricted utility, as the composition of the gases varies considerably within a few hours. The observation that the chimney gases contain a certain percentage of carbonic acid tells us very little; the same percentage may be too low if the setting is new and the flues are comparatively sound, and too high if the combustion extends far into the flues and is only completed in them. Simultaneous observation of the temperature would elucidate the question, were it not that the origin of the entering air is unknown; for it may have come from the exterior of the furnace or merely from the hot air passages. The conditions under which combustion is actually taking place may, however, be ascertained, if the zone of neutral combustion is located. Speaking generally, neutral combustion should occur

at the entrance to the flues—that is to say, at the outlet from the combustion chamber or arch of the setting. It should not move far from this point in the course of a day's working. To locate it, it is unnecessary to examine the whole of a series of flues; but the qualitative test described above may simply be applied to the flues adjacent to the neutral zone. The same test affords also a means of varying the position of that zone according to requirements.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Extension of Workmen's Breakfast Time.

SIR,—With regard to the recent alteration of the time allowed to our workmen for breakfast, to which reference was made in your last issue, will you permit me to say that the alteration has given very great satisfaction to our men?

It might have been supposed—indeed I thought so myself—that at Sydenham, where the majority of the men live close to the works, the additional quarter of an hour was unnecessary; but our experience proves that the extension of time is a great boon. It allows a number of men to breakfast at home who live just beyond the distance it was possible to go in the half hour; and it enables the others to get the meal in comfort, instead of bolting it in haste.

Another effect of the alteration is that there is far less disposition on the part of the men employed at the remoter end of the works, to get as near to the gate as they dare before the whistle is blown for breakfast. This, of course, is a saving to the Company—small perhaps in itself, but added to the satisfaction of the men and their physical improvement, it will go a good way to repay the cost of the concession.

Lower Sydenham, Oct. 29, 1898. SYDNEY Y. SHOUBRIDGE.

Intelligent v. Unskilled Labourers for Working Inclined Retorts.

SIR,—I am glad a gas engineer possessing the varied and successful experience of Mr. G. E. Stevenson, in the practical management of men in gas-works, has voiced the truth in the "JOURNAL" of Oct. 25 (p. 924), about the greater need than ever of intelligence among the men employed to operate mechanical appliances used in "up-to-date" retort-houses. I have been a life-long advocate of labour-saving machinery, but never from the standpoint that its wider adoption meant the degradation of intelligence among the working-classes, as appears to be the view of those who champion the advantages of "unskilled" labour in manipulating retort-charging machinery. The most important economic fact of our day is the constant increase of the amount of wealth that results from the work done by the same number of men. And the cause of this has not been the mere manual labour, but the gradual discovery of processes, the inventing of machines, or the more skilful directing of labour, all of which may be included in the word which Mr. Stevenson so happily uses—"intelligence." Our compulsory system of free education is rapidly raising this standard of intelligence; and in the face of this, our working-classes would, as Mr. Stevenson states, be quite justified in objecting to the use of machinery, if its adoption meant that there is to be no great difference in the future between the scales of remuneration of intelligent and ignorant labour. Besides, considering the high wages paid to workers in retort-houses, there is no need to employ labourers at work for which they are unfitted.

Managers of gas-works, of experience and ability, will utilize the machinery and appliances so that they will not degrade any portion of the community, or encourage a lower standard of intelligence; and I here wish to put on record that my experience has been that the managers (few in number, I admit) who have had any belief in "mere labourers" being the class to employ to operate the mechanical appliances used to charge inclined retorts, have been "penny wise and pound foolish." Apart from attending to the mechanical appliances, imagine your "mere labourer" charging and understanding the regenerative furnaces built on the scientific principles necessary to ensure effective heats for efficient carbonizing in inclined retorts. I do not say the employment of labourers has been the cause of "bad heats" and "pasty carbonizing;" but a manager employing raw labourers to attend to the charging machinery and the regenerative furnaces, can hardly be considered to possess the knowledge necessary to enable him to understand the many advantages of having men in a modern retort-house who have had some experience with machinery and furnaces. Next to the handy men of resource and aptitude, who do the work of assisting skilled engineers in engineering workshops, the most serviceable class in an inclined retort-house are men who have acted as attendants on engines and boilers; and I can remember that some colliers employed by Mr. Herring in the inclined retort-house at Huddersfield, exhibited considerable skill and care, and quickly became quite adept in handling the charging appliances.

It is not by belittling intelligence and skill, and unworthily praising ignorant and "unskilled" labourers, whose rural gaze is as dull as an ox, that the perfection we desire will be attained in retort-houses; and pandering to this sort of craze can only lead to disappointment on the part of those who are misled by it.

Smethwick, Oct. 27, 1898. GILBERT LITTLE.

Tramway Traction.

SIR,—In the triple capacity of a ratepayer, gas engineer (late head of the distribution department of The Gaslight and Coke Company), and interested party, I write, trusting you will afford space for insertion of my remarks in your columns, to urge that the above matter should be thoroughly ventilated before systems are decided upon and adopted at the public expense—less desirable perhaps than other systems not so well known, but nevertheless preferable from the standpoints of economy, efficiency, sightliness, and convenience. As a ratepayer, I have as much right to express my views as any other member of the public; and as an interested party, I have equally as much right to direct public attention to the system in which I am interested as others whose communications from time to time (and especially at the present moment, when London through its County Council is possibly on the eve of adopting mechanical traction) appear in the public Press. On these two grounds, therefore, I rely upon your consideration and sense of justice in regard to the trespass on your space that acquiescence in my request for insertion would involve. In my third capacity, naturally my sympathies are with the product with which I have for many years been directly in contact—viz., ordinary coal gas—one of the most useful servants in existence, universally available, and as a motive power for tramcars (when properly adapted) more economical for the purpose in question than any other product yet on the market, and at the same time equally, if not more, efficient and safe.

Electrical traction, although adopted in every civilized country, and that very widely, has been employed in preference practically to *animal* traction alone, and not because it has been proved to possess advantages over all other systems of mechanical traction—merely, rather, owing to the fact that no other motive power has been until recent years available, or since being available, brought into prominence. Experience has fully demonstrated the superiority of electrical as compared with animal traction; and the only question that exercises the minds of municipal authorities or owners of private undertakings possessing tramways is (in proposing to resort to mechanical traction) that of deciding between the various methods of utilizing this particular power product. On this point, I think the vast majority of people, in this country at least, object to the trolley system on account of the inconvenience and unsightliness of the overhead wires, and yet fear to adopt the less-tried conduit system on account of its excessive capital cost—even compared to the known heavy cost in this respect of the trolley system.

I notice Mr. J. Allen Baker, in his report to the Highways Committee of the London County Council, recommends electrical in preference to any other mechanical traction, and especially, although admitting its heavier cost, the conduit system—a recommendation it is difficult to understand except on the bare ground of sightliness (as compared with the trolley system, and leaving out of the question the remaining electrical systems mentioned in his report), in view of the conclusions arrived at by such Corporations as Leeds, Belfast, Glasgow, Sheffield, Birkenhead, and Liverpool, which after thorough investigation all negatived this very system, as will be found upon examining the reports submitted to them. Assuming, however, that Mr. Baker's recommendation were widely endorsed, and the "conduit" established as the best *electrical* system, what are the advantages dwelt upon as evidence of superiority as compared with other motive powers? Mr. Baker enumerates six—

1.—Its great elasticity; the ease and speed with which the cars can be started and stopped.
2.—Going backwards and forwards at will.
3.—Greater cleanliness and absence of wear to the streets.
4.—Greater comfort.
5.—Greater average speed than can be obtained as compared to horse or other (*sic*) forms of mechanical traction.
6.—Trailer cars can be put on during the "rush" hours mornings and evenings, and on holidays.

All these advantages, with the single exception of No. 5, are at least equally applicable to the system of gas traction, the merits of which I have in view in addressing myself to you, and (I trust) through you the public. With regard to No. 5, I accept this, but in a qualified sense only—viz., that as regards "speed" electricity is doubtless superior, if *excessive* rates of travelling were required; but up to 25 miles an hour (for light railways), gas traction possesses equal claims in this respect.

There are three advantages, however, and most vital ones, that are *not* claimed by Mr. Baker for electricity—viz., economy, convenience, and safety—in which respects gas traction is undoubtedly the system that can justly claim superiority. With regard to economy, and taking as the heads of cost (1) capital expenditure, (2) labour, (3) energy per car mile, and (4) administration, and assuming the last-named equal, no matter the system, of the remaining three, in the case of gas traction (1) is practically confined to the cost of the cars, as any existing well-laid line can be utilized, and compressing stations, the latter representing a comparatively nominal outlay only; (2) would compare favourably; and (3) is not more than one-third, amounting to 0·92d., including compression, with gas at 2s. 4d. per 1000 cubic feet, as compared, for instance, with Dover (trolley system), where an electrical unit costs 3d., and where the energy absorbed per car mile is 0·95 of a unit, and costs therefore 2·85d. With regard to convenience, the cars propelled by gas are absolutely self-contained. They travel 14 miles with one charge, and are re-charged in less than two minutes. Being self-contained, in the event of accident or damage to engine or gearing, a car can be taken off without the slightest interruption to the traffic, as compared with the *total* interruption necessitated in the case of a breakdown or defect in the generating plant or circuit of either conduit or trolley system of electricity. And on the question of safety, without recalling recent or remote instances of the dangers of electrical traction, I will merely state that not a single person has been injured, much less killed, while operating or travelling by the gas-traction system.

If you are good enough to insert this letter, interest may be aroused, and the following questions may be asked:—

1.—What system is referred to?
2.—Who are the owners?
3.—Where is the system in use in this country?

The replies to these questions are as follows:—

1.—That patented by Carl Luhrig, of Dresden, and H. P. Holt (of Crossley Bros., Limited).

2.—The Gas Traction Company, Limited, of 22, Chancery Lane, who acquired the all-world patents and disposed of the British Patent to the British Gas Traction Company, Limited, of 22, Chancery Lane.

3.—At Blackpool, on the lines of the Blackpool, Lytham, and St. Anne's Tramway Company, Limited, where 14 cars have been running during the past season. The receipts have averaged 1s. 1d. per car mile. The system has carried, since its inception in 1896, 1,150,000 passengers; and the cars have run 250,000 miles. At Trafford Park, on the lines of the West Manchester Suburban Tramway Company.

In addition to this, the British Gas Traction Company are now constructing a line from Bideford to Westward Ho, to be worked as a light railway; and they have contracted to work the lines of the Neath (Wales) Municipality.

I trust the foregoing will be sufficient to warrant full consideration being given to the merits of this system; my excuse for dilating upon which being that I was instrumental in introducing it to this country, I am interested in the world rights, and firmly believe it to be the best in existence.

8, *Regent Street, S.W., Oct.* 27, 1898. THOMAS C. HERSEY.

The Origin of Gas Associations.

SIR,—I am pleased, as I am sure all the members of the Waverley Association will be pleased, to learn from Mr. Myers' letter in last week's "JOURNAL" that he has taken the trouble to obtain, and so frankly to publish in your last week's issue, the copy of the minute of the first meeting of the Fife and Kinross Association, and that he now expresses himself satisfied that the Waverley holds the field as the parent of all other Gas Associations.

Personally, I never had the slightest doubt on the subject; but it is also satisfactory to know from Mr. Myers that his doubts are now removed, and that the Waverley Association being the first, the Fife and Kinross Association—of which Mr. Myers was one of the original members—follows the Waverley Association as "a good second."

Airdrie, Oct. 28, 1898. JAMES C. ADAMSON.

Gas Testing in London.

SIR,—The last half-yearly Notification of the Metropolitan Gas Referees differs but little from those which have preceded it during the past thirty years, except in the trifling matter of brevity. Perhaps this can be accounted for by the fact that the Referees have been so much engaged with the Harcourt-cum-Dibdin 10-candle pentane standard, the table photometer, the reduced measure for testing meters, and other matters which I consider useless, that they could not find time for a more extended Notification. They have therefore fallen back upon the diffuse one of 1897 and 1898, and have notified the Gas Examiners thus: "These regulations are to come into operation at each testing-place as soon as the prescribed apparatus has been provided by the Gas Companies."

I remember that at the last meeting of the Institution of Gas Engineers Mr. Frank Livesey told the assembled engineers that they all ought "to feel grateful to Mr. Harcourt for the time and attention he had expended on the new standard of light." I must confess I thought at the time Mr. Livesey was joking. But, at any rate, Mr. Harcourt must have taken the remark in earnest; and this doubtless accounts for the brevity of the Notification.

The statement, "as soon as the prescribed apparatus has been provided by the Gas Companies"—or, in other words, the gas consumers—makes one wonder whether the question of gas testing will ever reach the stage of finality in the hands of the Gas Referees. No sooner is one form of photometer prescribed than it is replaced by another, and generally for the worse.

It was about the year 1869 that the first official testing-place was set up at Arundell Street, Haymarket, by Mr. William Sugg, after the design of Mr. F. J. Evans, the then Chief Engineer to The Gaslight and Coke Company, who had been appointed one of the first Gas Referees; Mr. R. Hogarth Patterson, a journalist, and Mr. J. S. Pierce, a Volunteer major, being the two others. The appointment of the two last was a political job, as neither of them knew anything about the business; and to enable them to carry out the elementary chemical arrangements, they were obliged to obtain the services of Mr. Thompson, a young but able chemist, to help them out of their ignorance. They also engaged a Secretary to attend to the clerical work, at the same time securing large and expensive premises in Spring Gardens; for all of which the unfortunate gas consumers had to pay.

Mr. Evans not unnaturally selected a form of photometer designed by himself, and known as the "Evans;" and the rest of the apparatus, including the ingenious and accurate clock meter, was the invention of Mr. Sugg. It may safely be said that no better apparatus for testing gas at fixed stations could have been devised; and for many years it was the regulation apparatus.

After Mr. Evans had acted as the practical Referee for a few years, the anomalous position he occupied as Chief Engineer to The Gaslight and Coke Company and a Gas Referee being called in question, he at once resigned; and the Board of Trade at the same time refused to re-appoint Mr. Patterson and "Major" Pierce. Those who wish to know the whole of the facts will find them faithfully recorded in the "JOURNAL" about the years 1872 and 1873.

After this little episode, new Referees were appointed, one of whom was the late Professor Tyndall, who did nothing—except regularly draw his salary. Had all the Referees confined themselves to this pleasant mode of proceeding, but little fault could have been found; but they did not.

During this time Mr. T. W. Keates was the Superintending Gas Examiner to the Metropolitan Board of Works; and he wisely and considerately did his work. At his death, Mr. W. J. Dibdin was appointed in his place; and from this time matters commenced to rapidly change. Mr. Dibdin apparently became dissatisfied with the Evans photometer, and commenced to "tinker" with it by removing the top, knocking holes in the sides, and otherwise maltreating it; thus destroying all resemblance to the original Evans, and making it useless for either elegance or accuracy.

The Referees, probably feeling that their functions were being usurped, and goaded on by the activity of Mr. Dibdin, now commenced a regular crusade against the Evans photometer; and in rapid succession it was superseded by the Letheby, the improved Letheby, the Westminster Model Letheby, the Edinburgh Model Letheby, the Imperial Evans, the Gas Referees', Sugg's Imperial Standard, and other photometers.

It is quite safe to aver that, though every one of these instruments was the perfection of workmanship, not one of them was in any way more accurate than the old Evans. These changes have cost the gas consumers thousands of pounds without reason at all; and now we are told by the Gas Referees that they must all be discarded, and a table photometer set up in all the testing-stations—thus involving the unfortunate gas consumers in another huge expenditure.

It seems to me to be high time that the Gas Referees were called upon to "justify their existence." Manchester, Liverpool, Birmingham, and other places, get on very well without Referees; and London can do the same. During their lengthened tenure of office a sum of nearly £500,000 has been expended in connection therewith, more than £150,000 of which has been for salaries alone; while the 23 gas-testing stations have never furnished any protection to the public.

London, Oct. 15, 1898. VINCENT TAYLOR.

Faulty Syphon Pumps.

SIR,—When looking through the "JOURNAL" of yesterday's date, I noticed the paragraph on "The Recent Failure of the Gas Supply at Bournemouth." Having many years ago been *nearly* caught myself by a faulty syphon pump, I adopted a plan which I have continued ever since, and which will, I think, help anyone who does not at present use it. It is simply to sound the drips before and after pumping. Sounding before often saves the fixing of the pump, as we find no depth of water worth pumping. Where pumps are fixtures, means of sounding should be provided. I use an iron rod about 5 feet long, and a line long enough to reach the bottom of the deepest drip-box.

Montrose, Oct. 26, 1898. T. DOUGLAS HALL.

A Curious Property of Filtered Water.

SIR,—I have lately been troubled with a disagreeable taste and smell in the water supplied by some works of which I have the control. The water is taken from a stream in which there is no pollution, is filtered through sand and gravel, and is pumped thence into iron mains for the supply of the inhabitants. The taste, which can be detected in the stream for some miles above the intake, somewhat resembles cucumber; and though it can scarcely be distinguished as the water leaves the filter-beds, it becomes very marked when it is in the mains, and is subjected to pressure. The works have been constructed about forty years, and last autumn this curious feature for the first time appeared in the water.

I should be glad to know if any other managers have been troubled with this peculiarity, or if they can suggest the cause and its removal, as the analysis fails to give any information, and it cannot be discovered that any new weed or vegetation has been introduced into the stream during the last few years.

Oct. 24, 1898. PUZZLED.

Extension of Works on Land not Scheduled.

SIR,—For the information of the correspondent whose question on the above subject appeared last week, I may say that the Abergavenny District Council extended their gas-works about three years ago on land not originally scheduled, and without leave in writing from anyone. The process adopted was to send out printed notices of our intentions to owners, occupiers, &c., within 300 yards of the proposed new works; mentioning also that an Inspector from the Local Government Board would, on a given date, hold a public inquiry to take evidence on the matter. This was held, and in due time we received our order to proceed. This proves, I think, that leave in writing from owners, &c., is not required.

Abergavenny, Oct. 29, 1898. S. CROSS, Manager.

SIR,—In answer to your correspondent's question, there is a Special Act of Parliament applicable to Scotland—an Act to Amend the Burghs Gas Supply (Scotland) Act, 1876—which was passed in 1893. I know of only one instance in which the Act has been put in force—viz., at Gourock, in the spring of 1894. A report of the proceedings appeared in the "JOURNAL" at the time. The Police Commissioners there applied to the Sheriff of the County of Renfrew for permission to erect a gas-holder without obtaining the consent of all the householders within 300 yards. The Sheriff held a public inquiry, and gave the power asked; and there is now a holder upon the ground. If your correspondent resides in Scotland, he will find the Act of Parliament mentioned, and the case of Gourock, to meet his requirements.

Oct. 29, 1898. J. P.

Dover Public Lighting.—The Dover Town Council have accepted the offer of the Gas Company to enter upon a new three years' contract for street lighting as from the 31st prox. The terms are the same as those of the existing contract, but with a reduction of 5s. on each lamp. This will mean a saving of about £200 a year. There are 800 incandescent gas-lamps in the town.

Cape Town and District Water Company, Limited.—The tenth ordinary general meeting of this Company was held at the Cannon Street Hotel last Thursday—Mr. J. S. Prince in the chair. In moving the adoption of the report, the Chairman stated the revenue during the past financial year amounted to £19,215, as compared with £14,944 in 1896-7; being an increase of £4271. The net revenue from water supplied showed an increase of £2652 from the ordinary and regular business of the Company, without any exceptional supply to outside authorities. There had been an expenditure on capital account of £2189 for new mains, water-headings, meters, &c., during the year. The number of houses supplied had been 3615, as compared with 2952 for the previous year—being an increase of 663; and this in addition to the 1878 houses in Woodstock, which Municipality was supplied in bulk. The yield from the springs continued satisfactory. The quantity of water pumped had been 235 million gallons. All the works, engines, water-headings, and the property generally, had been maintained in thoroughly efficient working order and repair. According to the concession granted to the Company by the Claremont and Woodstock Municipalities, it was provided that they should have the right in ten years of acquiring the undertaking either at a price to be agreed upon, or to be settled by arbitration; and they had decided to avail themselves of the right conferred upon them. Negotiations had been opened with the local Directors with the view of the Municipalities taking over the concern as from Jan. 1 next. The report was adopted, and a dividend at the rate of 10 per cent. per annum was declared

LEGAL INTELLIGENCE.

Claim under the Employers' Liability Act.

At the Colchester County Court, before his Honour Judge Paterson, last Wednesday, Henry Broom, labourer, sued the Colchester Gas Company, under the Employers' Liability Act, for damages due to an accident while unloading oil barrels on the 12th of January last. On the previous day, a barge laden with barrels of oil came up to the gas-works quay, but could not be discharged owing to the unloading of some coal barges. The Gas Company's Manager (Mr. H. S. Pike) suggested that the captain of the oil barge should fix up some gear to enable him to get out the oil. This was done; and it was subsequently arranged that plaintiff and another man named Francis should have 1½d. per barrel for unloading the oil. Mr. Pike sent down two chains and four hooks. While the work was going on, the wire rope snapped, and the two casks attached to it fell into the hold. The plaintiff fell with them, breaking both his legs, fracturing his ankle, and being injured in various parts of the body; and he had not been able to do any work since. The rope was examined, and found not to have one bright strand in it, but to be rusted right through. Plaintiff was called, and, in cross-examination, said Mr. Pike did not call out to him: "Broom, you have no right to put two casks on that rope; it is only strong enough for one." If he did so, witness did not hear him. The captain of the barge did not tell him on three occasions that the rope was not strong enough to bear two barrels. He suggested that one barrel at a time would be easier to wind up. He did not hear anyone say the rope was not strong enough for two barrels. Simon Wyatt, a quay labourer, deposed that they had not been told the rope was only strong enough to hoist one barrel at a time. Mr. Wild, for the defence, submitted that, whoever was owner of the gear, the plaintiff and Francis made a distinct sub-contract with the defendants, and under this the latter retained no kind of control over the work. The relation of employer and workman therefore did not exist. Mr. Jones, on the contrary, submitted that there was evidence that plaintiff was a workman employed by defendants. It was not necessary to show that the rope was the property of the defendants, but sufficient to prove that it was used in their business; and it was unquestionably their business to unload the barge. A large number of other legal points were raised, and cases of a highly technical nature quoted. After a good deal of argument, his Honour decided that there was no evidence on which the Jury could have acted, and gave judgment for the defendants. He said he did so because he was satisfied that the plaintiff and Francis contracted to do the job of hoisting the barrels on to the quay, where they were to be further dealt with by the servants of the Company, and plaintiff had failed to show that he had suffered injury owing to the defect of any plant belonging to the defendants.

A Gas Stealing Case at Bristol—"A Deliberate and Clever Fraud."

Edwin Langford, a nautical instrument maker, of 53, Broad Quay, Bristol, was summoned, at the Bristol Police Court last Wednesday, on the complaint of the Bristol Gas Company, who alleged that during the months of July to October he fraudulently stole 9000 cubic feet of gas, worth 21s., their property. Mr. F. E. Weatherly prosecuted; and the defendant was represented by Mr. T. D. Sibly. Mr. Weatherly, before stating the facts of the case, asked leave to amend the charge by reducing the amount of gas alleged to have been stolen to 4000 cubic feet, worth 9s. 4d. Permission having been granted, Mr. Weatherly proceeded to say that the circumstances were so serious that the prosecutors felt it was one in which the charge of larceny should be preferred. Beneath defendant's shop there was a cellar; and on the right-hand side as one entered, the wall had been bricked up about 4 or 5 feet, no doubt with the idea of supporting the older foundations. It was the fact of the wall being bricked up that rendered it possible for the offence to be carried out. On an examination of the defendant's September quarter's account, it was found that the quantity of gas consumed showed a strange falling off; being about 9000 cubic feet less than it was for the corresponding quarter of the preceding year. Consequently an Inspector was sent to examine the premises. He went into the cellar and discovered a tap close to the street near the service pipe. About 10 to 16 feet along the wall was the meter, and also another tap. The position of the meter was irregular, for it should be fixed as close to the service-pipe as possible. The Inspector reported the result of his visit, which took place on Oct. 8. Four days later he called again, and made an examination with the aid of a spirit-lamp. Looking along the top of the wall underneath the joists from the meter, he was able to see not only the inlet-pipe from the service-pipe, but he also saw, about half-way, a pipe passing up into the shop. This connection obviously was on the service side of the meter; and the gas ascending the pipe did not pass through the meter. In consequence of this discovery, the Inspector went into the shop, and had the eleven burners he found there lighted. Then he turned off the gas at the meter; but instead of all of them going out, four were left burning—thus making it perfectly clear that the gas consumed by these four did not pass through the meter. Information of all this was sent to the head office of the Company; and Mr. Phillips, the Secretary, went without delay to defendant's shop. He found the door locked; and, looking through the glass, the defendant was observed behind the counter apparently hammering upon the flooring boards. Subsequently the door was opened; and on Mr. Phillips and the Inspector going behind the counter they found a loose board, underneath which was discovered the connection. Defendant at once said he had mistaken the inlet-pipe for the outlet-pipe. He admitted that he had been using this connection for the past three months all through this mistake; and it would be for the Court to say whether this was a sufficient answer. Defendant was a man not only expert in his own particular trade, but he did his own gas-fitting as well; and it would be simply idle to suppose that anyone was going to accept the explanation tendered. This was not the case of a hungry man stealing a loaf of bread, but a deliberate and clever fraud. Confirmatory evidence having been given, Mr. Sibly, on behalf of the defendant, said he must admit the charge, though the quantity of gas abstracted was not so large as alleged. He contended that the case could be properly dealt with, not under the present charge of larceny, but by means of a penalty. Defendant had already been heavily punished. He had been in business over 45 years, and was known as a respectable, hard-working tradesman. If the Court exercised the powers they undoubtedly possessed, and treated the case as one of larceny, the man would not only be disgraced, but ruined as well. He seriously asked the Court to believe that defendant had made a mistake, and did not wilfully steal the gas. The Magistrates, after a brief consultation, said they must deal with the case as one of larceny, and they fined the defendant £10, with £5 costs, or six weeks' imprisonment.

The Liability of Water Consumers for the Repair of Service-Pipes.

At the Cambridge County Court, last Wednesday, before Judge Bagshawe, the Cambridge University and Town Water Company sued Robert Farren for 11s. 3d., the cost of repairing a service-pipe leading from the main to his house in Trumpington Street. Dr. Cooper, in opening the case for the Company, said the amount involved was small, but the point raised was important; and he should have to draw his Honour's attention to the Company's Acts of Parliament. He then read excerpts from those Acts, in which it was set forth that the cost of any repairs to a service-pipe should be charged to the occupier of the house. Defendant said he was not the tenant of the house, nor was he a householder in the town at all. He had paid the water-rates—at least, he had signed cheques for his daughter who was the tenant. He simply acted as her agent. In reply to his Honour, he said he would accept the responsibility, but still disputed the debt. Dr. Cooper pointed out that the Company's Act of 1853 governed the General Act of 1847. It appeared that on Saturday, Nov. 28, 1896, a leak was discovered in Trumpington Street, and one of the Company's men found it in the service-pipe leading to the defendant's house. Water was escaping. The leak was undoubtedly caused by the contractors for the sewerage, and the Water Company had no power to sue the Corporation. His Honour said he was of opinion that unless the leak was caused by the Water Company themselves, the defendant was liable. If it was caused by a third person, the defendant had his remedy against that person. Dr. Cooper said the defendant's contention was, first, that the pipe was not his; and, secondly, that the Company should go to the Corporation for the money. A plumber named Taylor, in the service of the Company, was called, and said he repaired the leak, and the cost was 11s. 3d. The defendant was then informed by his Honour that, by the Company's Acts, if any pipe leading from the main was damaged, the Company were entitled to charge the occupier of the house with the cost of the repair. Not merely could they do this if the damage was caused by the tenant's negligence, but also if it was caused by a third person. The occupier could then say to that person, "You have smashed my pipe. I have had to pay the Water Company, and you must pay me." If the Corporation had done this damage, they ought to pay. The pipe was leaking, and was repaired by the Company. He expressed the opinion that the charge was reasonable, and gave judgment for the plaintiffs.

Gas Workers' Wages.—A meeting of stokers employed by the West Ham Gas Company was held at Stratford on Wednesday night, and a resolution was passed to petition the Directors for 15 per cent. increase of wages. Mr. W. Thorne, the General Secretary of the Gas Workers' Union, who attended and spoke, said there was an upheaval in the ranks of men employed in gas-works throughout the United Kingdom, and in his view no gas worker should have less than 30s. a week.

The Conversion of the Scarborough Gas Company's Capital.—In pursuance of section 4 of the Scarborough Gas Act, 1895, the £20,000 of ordinary 10 per cent. stock, the £30,000 of ordinary 7½ per cent. stock, and the £72,657 of ordinary 7 per cent. stock, created by the Company's Acts of 1851, 1859, 1867, and 1873—amounting in all to £122,675—were converted on the 1st ult. into £186,719 16s. of consolidated ordinary stock, bearing a uniform dividend of 5 per cent. per annum. The Company have also £27,343 of 5 per cent. preference capital, and £16,830 of 5 per cent. ordinary capital (raised under the Act of 1895) which has produced a premium of £4219 5s. The Company have now £38,950 of ordinary capital unissued.

Additional Capital for the Manchester Corporation Gas Undertaking.—At a special meeting of the Manchester City Council held last Wednesday, the Lord Mayor (the Right Hon. Alderman Gibson) moved the adoption of a recommendation to apply to the Local Government Board for a Provisional Order to alter and amend the Acts of 1875, 1880, 1884, and 1893, so as to enable the Corporation to borrow such further sums, not exceeding in the whole £500,000, as may from time to time be necessary for the purposes of the gas undertaking. His Lordship said that five years ago the Committee asked for power to borrow £500,000. This they obtained, and had exercised it; and with the exception of about £30,000, they had spent the money. The result had been very satisfactory—a considerable profit accruing to the city. He believed it would be the same with the money they now proposed to borrow. The resolution was passed.

Gas and Electric Lighting in Brussels.—When the Municipality of Brussels, a few years ago, proposed to light public places, such as railway stations, parks, &c., by electricity, and to supply current the same as gas, a great outcry was raised, and protestations were made against the innovation; it being urged that it would ruin the gas undertaking and injuriously affect the communal exchequer. Recent statistics show that during the past year not only has the use of electricity increased, but that the profit from the sale of gas is considerably in excess of that of previous years—being £8896. The most important installation of the electric light recently made in Brussels is in the King's palace. When the work is finally completed, there will be 7500 lamps, of which a large number will be of 5-candle power, employed in the chandeliers illuminating the ball and reception rooms. According to the United States Consul at Brussels, there are about 47,391 lamps reduced to the unit of 16 candles in the city system, averaging 117 lamps per 100 metres of cabled streets. This number includes 770 arc lamps and 28 electric motors; the latter varying from 0·1 to 10 horse power, with a total of 105-horse power.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The First Annual General Meeting of this Association was held on Thursday last, at the Westminster Palace Hotel—Mr. GEORGE LIVESEY in the chair.

The gentlemen present were: Mr. Thornton Andrews (Swansea), Mr. G. Clarry (Cardiff), Mr. W. F. Cotton (Dublin), Mr. H. Hart (Canterbury), Mr. J. W. Helps (Croydon), Mr. H. E. Jones (Commercial Gas Company), Mr. William King (Liverpool), Mr. W. R. Phillips (Hitchin), Mr. R. O. Paterson (Cheltenham), Mr. C. Sellers (York), Mr. S. Y. Shoubridge (Crystal Palace District Gas Company), Mr. C. C. Smith (Southampton). Mr. Hanbury Thomas (Sheffield), Mr. C. E. Botley (Hastings), Mr. A. G. Snelgrove (West Ham Gas Company), Mr. H. B. Chamberlain (British Gaslight Company), Mr. James Pye (Chester), Mr. E. G. Burton (Brighton), Mr. G. B. Irons (Gosport), Mr. H. H. Jones (Wandsworth and Putney Gas Company), Mr. C. M. Ohren (Crystal Palace District Gas Company), Mr. W. W. Box (Pinner), and Mr. Benjamin Green (Mitcham).

The CHAIRMAN, in opening the proceedings, said it was not a large meeting, but it would no doubt be large enough; and he thought they might assume that the bulk of those who had given their adhesion were satisfied to leave the business to those who cared to attend. He would first ask the Secretary to read the minutes of the previous meeting, and then the list of the Gas Companies who had joined.

The SECRETARY (Mr. F. E. Cooper) then read the minutes of the meeting held on June 7. He also reported that he had letters from three gentlemen regretting their inability to be present—viz., Mr. Phillips (Luton), Mr. Holliday (Scarborough), and Mr. Berridge (Leamington Priors). The total number of Gas Companies who had joined was 56, two of whom had joined during the present week. He feared there was some little misapprehension among some of the smaller Companies as to their being eligible, as several who had sent subscriptions had done so through a larger Company, and others said that they were informed by a larger Company that they were ineligible. The total amount of subscriptions received was £284 11s., in addition to which the Liverpool Gas Company, though not at present joining, had sent a contribution of £10 10s. towards the preliminary expenses; making a total of £295 1s. The Provisional Committee had paid an honorarium of fifty guineas to the Secretary for the work he and his clerks had done, and also his out-of-pocket expenses to the amount of £24 15s. 7d.—making a sum of £77 5s. 7d. This left a balance in hand of £218 5s. 5d.

The following is the list of Gas Companies who have joined the Association:—

Gaslight and Coke
South Metropolitan
Commercial

Alliance and Dublin Consumers'
Banbury
Barking
Barnet District
Barnsley
Bath
Brentford
Brierley Hill District
Brighton and Hove
British
Canterbury
Cardiff
Cheltenham
Chester United
Crystal Palace District
Devonport
Dudley
Faversham
Gosport
Grantham
Gravesend and Milton
Hartlepool (Gas and Water)
Hastings and St. Leonards
Hitchin
Hornsey
Kettering
Leamington Priors
Lewes
Lichfield
Llanelly
Luton
Maidstone
Malton
Mitcham and Wimbledon
Newmarket
Pinner
Preston
Reading
Rugby
Scarborough
Sheffield United
Southampton
Southend
Sunderland
Swansea
Torquay
Tottenham and Edmonton
Ventnor (Gas and Water)
Walker and Wallsend
Wandsworth and Putney
West Ham
West Kent
York United

The CHAIRMAN then said the Secretary had put the position of affairs very clearly. He had been requested by Colonel Makins to express his regret that he could not be present; but he had to sit on the Bench on an important rating case. He had told the Secretary that whenever any work was required of him, particularly in connection with members of Parliament, he should always be ready to do all that he could. This was very satisfactory, because Colonel Makins was a man of great influence in Parliament; having been a member for so many years, and knowing so many members. The Provisional Committee was appointed at a general meeting on June 7; and the main duty which devolved upon them was to draft a set of rules in order that Gas Companies might be invited to join, because, of course, if applications were made to Companies without sending out the rules, it would have been very natural for them to ask what were the objects of the Association. Consequently the Provisional Committee had formulated a set of rules; and the Secretary had sent out copies to Gas Companies all over the kingdom.

The SECRETARY stated that the rules were sent to Companies having a capital of £30,000 and over.

The CHAIRMAN said he thought this was a mistake. It was perfectly clear that the notification of the formation of the Association ought to be given to all Gas Companies eligible.

The SECRETARY pointed out that there was a minute of the Sub-Committee to the effect that they should be sent to Companies with £30,000 capital and upwards.

The CHAIRMAN said it was really a mistake.

The SECRETARY believed the impression of the Sub-Committee was that they should not send the circular to Gas Companies indiscriminately in the first place, but that it would be better to start by obtaining the adhesion of some of the largest Companies; and therefore the circulars were only sent to those having a fixed amount of capital.

The CHAIRMAN did not suppose anyone on the Committee had any idea of limiting it ultimately; and after the present meeting the rules should be sent to all Gas Companies, with an invitation to them to join. He would now submit the rules to the meeting for approval—that being the first general meeting of subscribers which had been held. The Company which Mr. King represented had raised the question whether the powers contained were not rather too wide. Their idea, which he believed accorded with the general idea of the Association, was that it should be a watching Association—that they were not to assume that they had a commission to do everything and anything connected with Gas Companies whenever their interests might be effected, but to watch all attacks, especially what went on in Parliament, which might be injurious to their interests, to promptly report it to the members, and then it would rest with the Committee to take such action as might be considered necessary. In Rule 3, which stated the objects of the Association, it had been already agreed to strike out the word "revenues" which occurred in the draft rules, and it would then run thus: "The objects of the Association are to protect the property, rights, powers, and privileges of Gas Companies, and to take all such proceedings, and to secure such joint action, as may be considered necessary for effecting all or any of such objects, and generally to inform the members of all proceedings in Parliament or elsewhere affecting Gas Companies." Their friends at Liverpool rather took objection to the wideness of thus empowering the Association to take all such proceedings, and securing such joint action as might be necessary. But the Association could only do this through their Committee; and in Rule 13 the duties of the Committee were set forth. If the Association elected a fairly representative Committee, he thought it would be necessary to trust them with a certain discretion, to act promptly on an emergency if necessary. Rule 13 gave them tolerably large powers; but there was a very effective limitation, because they could only deal with funds at their disposal, and their only funds would be the subscriptions of the members. If the Committee were an ambitious body, and wanted to engage Counsel and spend money on all sorts of things, they would have to look at ways and means. He did not think there was any fear that they would go into unreasonable or unjustifiable expense, because if they did they would be personally responsible. On the other hand, if it should be found necessary on an emergency to take some definite action, and their funds were exhausted, he thought the Committee would probably act at once, and trust to the members indemnifying them when they explained the necessity of the course which they had taken. If anyone considered any alteration necessary, he would be at liberty to propose it, because at present the rules were not binding. After they were passed at this meeting, however, they would be binding, and could only be altered, according to Rule 22, by proper notice and a special resolution. The only other point which gave rise to difficulty was fixing the amounts of contributions, which, after a deal of discussion, were settled as shown in Rule 6. There was a suggestion to make one step between three and five guineas; but the Committee, by a large majority, agreed to the scale now submitted. He would, therefore, move that the rules, with the alteration he had suggested, be adopted. Mr. King who was present said he was not a member; but his Company had subscribed ten guineas towards the preliminary expenses, and he was sure they would like to hear anything he had to say.

Mr. W. KING (Liverpool) said the point alluded to by the Chairman was the one which his Company rather took exception to. They thought the action of the Association should be rather passive than active—that it should act as a sort of watch dog, very much as the old Gas Companies' Association did, to watch any proposed legislation, and at once issue a warning-note to all Gas Companies calling attention to it, and leaving them to take action in the matter. This was the only point to which he wished attention to be drawn.

Mr. H. E. JONES (Commercial Gas Company) said he should like to second the motion of the Chairman, with a slight amendment of Rule 3, which he thought would meet the views of Mr. King and his friends. He then proposed that the rule should run as follows: "The objects of the Association are to inform the members of all proceedings in Parliament or elsewhere which affect the rights, powers, privileges, and property of Gas Companies, and to take such proceedings as may be necessary to secure joint action for the protection of the same."

Mr. C. E. BOTLEY (Hastings) said he thought this fully expressed the meaning of the Association. Many of them, in bringing the matter before their Boards, simply said it was intended to revive the old Gas Companies' Association, and put a little more vigour into it.

The CHAIRMAN then put Rule 3, as amended, to the meeting, which was agreed to. He then put the whole of the Rules *en bloc;* and they were adopted.

The CHAIRMAN then said the Provisional Committee had now to retire; but before doing so, he must ask the meeting to authorize what had been done in the shape of paying expenses up to the present time. These included certain printing expenses, a little over £20, and also the vote made to the Secretary of fifty guineas for his services, and the aid of his clerical staff.

Mr. E. L. BURTON (Brighton and Hove) moved that the proceedings of the Provisional Committee be approved and confirmed, and the expenses incurred paid, including the honorarium of fifty guineas paid to the Secretary.

This was seconded and carried unanimously.

The CHAIRMAN said it now only remained to appoint a permanent Committee.

The following gentlemen were thereupon appointed:

Mr. George Livesey (South Metropolitan Gas Company), *Chairman.*
Mr. Thornton Andrews (Swansea Gaslight Company).
Mr. G. Clarry (Cardiff Gaslight and Coke Company).
Mr. W. F. Cotton (Alliance and Dublin Consumers' Gas Company).
Mr. H. Hart (Canterbury Gas and Water Company).
Mr. J. W. Helps (Croydon Commercial Gas and Coke Company).
Mr. H. E. Jones (Commercial Gas Company).
Mr. William King (Liverpool United Gas Company).
Col. Makins (Gaslight and Coke Company).
Mr. W. R. Phillips (Hitchin Gas Company).
Mr. R. O. Paterson (Cheltenham Gaslight and Coke Company).
Mr. C. Sellers (York United Gas Company).
Mr. S. Y. Shoubridge (Crystal Palace District Gas Company).
Mr. C. C. Smith (Southampton Gaslight and Coke Company).
Mr. Hanbury Thomas (Sheffield United Gas Company).
Mr. C. E. Botley (Hastings and St. Leonards Gas Company).
Mr. A. G. Snelgrove (West Ham Gas Company).
Mr. H. B. Chamberlain (British Gaslight Company).

The CHAIRMAN said this concluded the business; and he might add

that the Secretary would at once send circulars to all Gas Companies throughout the kingdom.

Mr. C. C. Smith (Southampton) proposed a vote of thanks to the Chairman, which was seconded by Mr. Jones, and carried unanimously.

The Chairman thanked the meeting, and the proceedings terminated.

EXTENSIONS AT THE ST. HELENS GAS-WORKS.

Last Thursday, the members and officials of the St. Helens Corporation accepted the invitation of the Chairman of the Gas Committee (Mr. Alderman T. Cook) to inspect the gas-works, which have recently been considerably extended under the supervision of Mr. S. Glover, the Gas Engineer to the Corporation. The visitors were received at the works by the above-named gentlemen, the latter of whom conducted them through the establishment, and explained in a concise and interesting manner the processes connected with the manufacture and purification of gas.

Before referring to the extensions, it may be of interest to trace briefly the development of the undertaking. The works were originally established, under the provisions of an Act of Parliament obtained in 1832, by the St. Helens Gas Company; and they were, of course, on a very modest scale. In 1869, however, the Corporation obtained power, by the St. Helens Improvement Act, to purchase the undertaking; and it was acquired as from June 30, 1875, at the price of £131,600. In the year 1880, the production of gas was 110 million cubic feet, and the price 4s. per 1000 cubic feet net—meter-rents being charged. Since then the works have been entirely reconstructed. Previous to the present extensions, the make for the year ending 1897 was 256 million cubic feet. The retort-house, which was then working to its full capacity, was 180 feet long, containing 210 retorts and one set of West's charging and drawing machines and coal-elevating machinery. The extension just completed adds 100 feet to the length of the retort-house, and a bench consisting of nine arches containing 126 retorts. These will be worked by a duplicate set of West's machinery and elevators, and a coal-conveyor across the retort-house. The house will now be capable of producing 2 million cubic feet of gas per day. The present storage capacity is equal to 1¾ millions. The quantity of gas unaccounted for is now less than 5 per cent., which is very low for a mining district. Previous to the Corporation taking the management of the works, however, it was upwards of 13 per cent. Oil gas and cannel gas are used as enrichers. The works are equipped with plant for the manufacture of sulphate of ammonia and the distillation of tar. The area of the works is 5¼ acres at the Warrington Old Road, in addition to which there are 9¾ acres at Eccleston, part of which is used as a gasholder station. The area of supply, including the township of Haydock, is 14,006½ acres; and there have been 56 miles of mains laid within this area. The number of consumers' meters at the present time is 6468 (for which no meter-rent is charged), consisting of 3573 ordinary and 2895 prepayment meters. It should be mentioned that St. Helens was one of the first towns to adopt the latter method of selling gas. The number of street lamps is 1580; and there are more than 2323 cooking and heating stoves in use—St. Helens being the first, we believe, to lend these appliances free of charge to gas consumers. The production of gas for the year ending March 31, 1898, was 270 million cubic feet, and the average price received was 2s. 4d. per 1000 cubic feet of gas sold, including all classes of consumers. The Gas Department has contributed to the borough fund account since 1880 the sum of £41,030, in addition to capital charges paid out of surplus profits, amounting to £23,370; and the capital account of the works now stands at £179,600. A fact that should not be overlooked in connection with the gas-works is that they have had at their head, as Chairman of the Gas Committee, since the Corporation took over the undertaking, a capable Engineer in the person of Alderman Cook, who has spared no effort to bring the works to the highest state of perfection; while Mr. Glover, who was appointed on the death of Mr. Hall in 1886, has since conducted the works with great skill.

The party were first conducted into that part of the works in which all the trains of coal-waggons are received. The total weight of material handled is about 40,000 tons per annum. The retort-house was next visited. This building, with its recent extension, and the coal-store running parallel with it on both sides throughout its entire length, presented a fine appearance, and was well equipped for the purpose to which it is devoted. The process of making gas at St. Helens, which has been described by Mr. Glover, was fully explained. The small retort-house in which the oil gas is made was next visited. The material used is Scotch shale oil; and the gas made is of a very high enriching value. The course of the main volume of gas was now followed as it left the retort-house to be purified, measured, and stored. The works for the distillation of tar and the treatment of ammoniacal liquor were next inspected; and a visit was subsequently paid to the electricity generating station. After the inspection, the party took luncheon at the Town Hall—the Mayor (Alderman R. Pilkington) presiding. Complimentary toasts were duly honoured, and responded to by Alderman Cook, Mr. Beecham (Deputy-Chairman of the Gas Committee), and Mr. Glover—the last-named gentleman stating that he had been associated with the works for the long period of 28 years. The day's proceedings were brought to a close by Alderman Cook thanking the councillors for accepting his invitation.

New Joint-Stock Companies.—The Crowborough District Gas Company, Limited, has been registered with a capital of £25,000, in £1 shares, to acquire and carry on the undertaking of the Provincial Gas-Works (Crowborough), Limited, registered in 1897, carried on in Crowborough and Rotherfield, Sussex, and to enter into an agreement with E. O. Preston. The General Water Power, Limited, has been formed with a capital of £21,500, in £1 shares (of which 1500 are deferred), to produce electricity by means of water power or otherwise, and to carry on the business of electricians and suppliers of electricity. The Catrine Gas Company was registered in Edinburgh last week with a capital of £1225, divided into 700 shares of £1 15s. each, to acquire, by purchase, the undertaking of the present Company.

ROTHERHAM CORPORATION GAS SUPPLY.

Additional Borrowing Powers—The Dispute at the Gas-Works.

At the Meeting of the Rotherham Town Council last Wednesday—the Mayor (Alderman Neill) in the chair—the subjects of the additional capital required for extending the gas-works and the dispute which has arisen with the stokers were brought forward.

The Town Clerk (Mr. H. H. Hickmott), referring to the subject of the additional capital, said it would be remembered that some time ago the Council decided to make application to the Local Government Board for further borrowing powers with respect to the extensions and additions to the gas-works. He had gone into the matter, and it appeared to him to be doubtful whether the Board could, under the powers of the Public Health Act, sanction borrowing powers with respect to gas-works extensions. He had seen the officials in London, and gone into the question, and had since received a letter to the effect that the Board would not be prepared to entertain any application for their sanction to a loan for such purpose under the provisions of the Public Health Act; but that it would probably be necessary for the Council to obtain further borrowing powers by an amendment of their Act. Under their Act of 1896, the Corporation obtained power to borrow £20,000 for gas-works extensions. This had been exhausted, and as the Corporation contemplated further contracts, he suggested that the matter should be deferred until the Finance Committee's minutes were dealt with. The Chairman of that Committee would move a resolution to alter section 27 of the Corporation Act of 1896, so that the powers to borrow £20,000 should read £60,000, and also such further money as the Local Government Board might sanction from time to time. This would mean that in future they would not have to apply for a Provisional Order to meet their further requirements for the gas-works.

At a subsequent stage of the proceedings, a resolution to the above effect was passed.

Mr. Gummer then submitted the recommendations of the Gas-Works Committee. In doing so, he referred at some length to the dispute at the gas-works. He said negotiations had been entered into with the men who were dissatisfied with their work; and it would perhaps be of interest to the Corporation and the public, who had had the men's statement (see *ante*, p. 925), that he should review the position. In the first place, on the 8th of September four stokers, named Richmond, Doncaster, Black, and Crowther, waited upon him with a view to discuss the wages that were paid in the new house fitted with inclined retorts. He made certain proposals, which had been before the Committee, and which had been supported since. The first was that the men should go on at the amount proposed—viz., 5s. per shift of eight hours—until the Committee met, and let the Committee decide the price to be paid; and that whatever was the price, it should date from the time the men commenced. The men, however, declined to accede. He then suggested that the men in the old retort-house should continue at work on the present arrangement until the Committee met, with no alteration in the wages. The men again declined, and said that, unless something was done in regard to the wages of the men working the horizontal retorts, they would hand in their notices. He suggested, further, that the men should commence work at the old rate (and a good deal had been made about the old rate at the men's meeting)—viz., 5s. 7½d. per shift—and that this should hold good until the decision of the Sub-Committee, which should be regarded as final; and such men as did not agree thereto should be at liberty to cease work in 14 days. This agreement was signed by himself on behalf of the Committee, and on behalf of the men by Amos Black; so that the alteration they made about the 5s. 7½d. per shift was only a temporary arrangement until the Committee had time to decide on the course to be adopted. There was a further meeting afterwards between the deputation of the stokers and the Sub-Committee on account of the decision of the Committee to support a proposal to pay 5s. per shift. After a long interview, the men said they preferred to work at the old retorts, as they, or part of them, were likely to be in use another twelve months. They were told that all the old stokers could do so if they wished, and could take their places there in preference to any of the new men; and when the old house was let down, the old men should have the opportunity of returning to the new house on the terms settled and fixed by the Committee (though other men should be then in such new house). The men intimated that they accepted this offer; and the matter was then left in the hands of the Engineer (Mr. F. A. Winstanley) to arrange accordingly. An agreement was decided to be entered into in future with the stokers on the new retorts. The three men appeared before the Sub-Committee, and it was agreed that the price should be 5s. per man per shift of eight hours per 3 tons 10 cwt. of coal carbonized, and 1d. for every hundredweight over and above 3 tons 10 cwt. per eight-hour shift. The only stipulation was that the men should go to the horizontal retorts if they wished to do so. This gave dissatisfaction to the men set to work at the old retorts, and the result was that they asked the Sub-Committee to meet them again. The meeting took place on the 13th of October, when the Sub-Committee received two representatives from the stokers, who stated that the men in the horizontal house under notice had not had a chance of going into the new retort-house, and that the Engineer had engaged other men to go there. The Committee pointed out that the men had had the chance, and had refused to avail themselves of it, and that a notice had afterwards been posted up to the effect that if any man wished to work on the inclined retorts he was to make application on or before the 11th of October to the Engineer; and as such men had not applied by the specified time, others had been engaged. In addition to the notice, the foreman had personally waited upon each man who was working at the new retorts, and asked if he was desirous of engaging himself upon the new terms. Every one refused; and their position was that they were compelled to make arrangements to have new men to carry on the undertaking. He further explained that the stokers had wished that some of them should be set on as labourers in the yard. This would mean a displacement of the labourers with whom they had no quarrel. The men were told that if they did not care to carry out the work the Sub-Committee suggested they would have to leave. He then proceeded to refer to the statements made at the public meeting, where Mr. Swallow had said that the Engineer had put extra work on the men in the short space of time, that they had twelve more retorts to draw, and that he wanted to know where the system was going to end. He (Mr. Gummer)

denied the statement that they were continually adding work, and pointed out that the men had furnished no statistical proof. At the men's meeting, a resolution was passed expressing an earnest desire that the Gas Committee would at once meet a deputation of the stokers, and try to come to an amicable settlement, and a copy of it had been forwarded. In reply, the Town Clerk wrote on the 24th of October to the effect that it was not in the power of the Chairman to consent for a deputation to meet the whole of the Committee. At the same time he reminded the men that the Committee had met several deputations of the stokers, and done everything possible to avoid dispute, and at one of the meetings a deputation agreed to terms and conditions of work in the new retort-house. These were not being carried out; and no attempt had been made to make any alteration in the old house, or interfere with Mr. C. E. Rhodes's award of 1897. The speaker then proceeded to show the position of the Rotherham stokers as compared with those of other towns. The average price was 4s. 8d. per day of eight hours. At Brentford, 5s. 8d. was paid for carbonizing 8 tons of coal; in Rotherham, 5s. for 3½ tons. He also quoted figures relating to Burnley, Coventry, Huddersfield, Leigh, Middlesbrough, Newcastle, Rochdale, and Salford. In addition, he said he had sought the advice of the Consulting Engineer, who, after comparing the two systems of carbonizing coal, recommended that they should pay their men 5s. per shift of eight hours, that a basis of 3 tons per man should be taken, and that three men per shift should work the three settings—doing everything necessary. Mr. Gummer further commented on the work done in other towns; showing that while the hours and the demands upon the men at Rotherham were less, their wages were higher than those of other places. He asked the Council to support the Committee in their action. A good deal of feeling had been engendered owing to a probable strike. He did not know who had done it, but someone on the previous night was responsible for having tampered with the plant of the new retort-house. He was not laying the blame anywhere, but the whole of the water-valves were closed, with the result that if the thing had gone on very much longer all the furnaces would have collapsed, for they were at white heat. It was not the first difficulty they had had to put up with; and whatever might be decided upon that day, he thought that the plant of the Corporation should be protected, and that no one should be foolish enough to attempt to damage it.

Mr. Copley seconded the motion, and urged that the men should give the proposals of the Sub-Committee a fair trial.

The Mayor expressed the opinion that the time had arrived when the men who had given in their notices should be dealt with, and should not be reinstated. It would be unfair to cast aside the new men under the circumstances.

Mr. Gummer, in reply to questions, denied that the new men were being paid a higher rate of wages than the old ones, for less labour.

The recommendations were passed.

In accordance with the notices sent in, 24 of the stokers left their work on Thursday. An open-air meeting was held on Sunday morning in the College Yard, Rotherham, when addresses were delivered setting forth the position of the men, for whom a collection was made.

RETFORD CORPORATION GAS AND WATER SUPPLY.

The annual reports of the Retford Corporation Gas and Water Departments were issued last Friday. In the first place, the Gas Committee report that the amount over-expended on capital account to the end of June last is £418; and further outlay is contemplated. It is proposed to rebuild a retort-bench on the regenerator system, with settings of seven retorts in each bed, instead of five, as at present. This will enable the works to meet the increasing demand for gas, and will lead to a considerable economy in the working. It will, however, cost something like £1500, of which two-sevenths will be charged to the capital account, and the remaining five-sevenths, being renewals, will be charged to the profit and loss account. To meet the amount already expended on capital account and this further expenditure, it is proposed to transfer £1500 from profit and loss to capital account. The gross profit for the year is £3109, as against £2968 for the preceding year. The net profit is £1632; and after adding to this £2610 brought forward from preceding years, and deducting the £1000 paid to the Corporation, the sum of £3292 is left at the credit of profit and loss account. The Committee have carefully considered the question of reducing the price of gas. A considerable portion of the profit made by the undertaking is attributable to the fact that, by charging upon the rates the capital borrowed for the undertaking, it has been raised at a rate fully 1 per cent. less than it could otherwise have been borrowed at, and has so effected a saving of £300 a year. The ratepayers who found this security have since received a little over £4000, or about £200 a year. Since the undertaking has been in possession of the Corporation, the price of gas has been reduced from 4s. 5d. to 3s. 4d. per 1000 cubic feet, with a discount in each case, which is equal to a saving to the gas consumers of £2250 per annum. The Committee recommend a reduction of 2d., which, with the discount, will bring down the price to 3s. per 1000 cubic feet. The Committee also recommend that the maximum price per public lamp be £3 per annum, instead of £3 10s. With the exception of the retort-bed, the plant is in good order; and the Committee pay a high tribute to their Gas Manager (Mr. J. B. Fenwick), to whom they recommend a grant of 50 guineas as a gratuity.

The Water Committee report that the water-rents of the year amount to £2481, as compared with £2231 for the preceding year. The net surplus revenue, after paying all interest and instalments on account of principal, is £485; and the amount standing to the credit of the profit and loss account is £2012, which, when transferred, will reduce the capital account to £512.

Lambeth Water Company.—The Directors of this Company have decided, subject to audit, to transfer £5000 to the contingency fund, and to recommend the payment of a dividend for the past half year at the maximum rates, and of 5s. per cent. (being at the rate of ½ per cent. per annum) on account of arrears of dividends; leaving a balance of £6000 to be carried forward after making provision for the payment to the sinking fund.

REIGATE CORPORATION AND THE LOCAL GAS COMPANIES.

A Purchase Bill to be Promoted.

A Special Meeting of the Reigate Town Council was held on Monday last week—the Mayor (Mr. F. E. Barnes) in the chair—for the purpose of considering the propriety of promoting a Bill in the next session of Parliament for the following purposes: "For acquiring the undertaking of the Reigate Gas Company, Limited; also for acquiring the undertaking of the Redhill Gas Company, and the lands, buildings, and plant of the said respective Companies; and for other purposes relating thereto."

The Mayor proposed a resolution sanctioning the promotion of a Bill to authorize the Corporation to acquire the two undertakings above referred to; the costs to be paid out of the borough or district fund, or such other fund as Parliament might determine. In doing so, he reviewed at some length the proceedings of the Council in connection with the Bills promoted by the two Gas Companies last year, and the results thereof. He reminded the Council that the House of Lords Committee decided that the Bill of the Redhill Gas Company could not proceed unless two clauses were inserted—one being that the Council should this year have power to promote a Bill for compulsory purchase; and the other that the standard price should be reduced. He thought no more conclusive decision could have been given; and he expected that the Company would immediately lower their price. But they had not done so. The Council had therefore to consider whether they would go on with their Bill or withdraw. They decided to go on; and a Parliamentary Committee was formed to take the necessary steps. The Companies had been invited to meet the Corporation in a friendly manner; but they had declined. There were two courses open to them. They might have said that, as the Council and ratepayers seemed intent upon this matter, a scheme should be arranged which would be fair and satisfactory to all concerned; but they had not done so. Or they might have made overtures to the Council as to the price that should be charged. If the Companies had come to them and said: "If you will withdraw your opposition to our Bill, we will guarantee that the price shall not exceed what is charged in neighbouring districts and municipalities," the Council might have dropped the matter. They might be sure that if they did not proceed at once the Companies would do so. He would state to them, as carefully as he could, what would be the results of going to Parliament. He was afraid it was out of the question to promote a friendly Bill with the Companies; therefore they would have to go to Parliament themselves, and assert their rights. Parliament would give them what they asked for; and the purchase price would be settled by arbitration. The question then came: What was the award of the arbitrator likely to be? The Reigate Gas Company had no parliamentary powers at all. It was a limited Company, with a nominal capital of £20,000, of which £18,105 had been spent on works, land, &c., leaving £1900 as working capital. The expenditure in the year before the present for alterations and renewals, rates, taxes, wages, &c., amounted to £5440; and after this they had a profit of £3520, or 17½ per cent. on the total capital of the Company. Besides this, they possessed at that time a reserve fund of £9000, which had been accumulated out of the profits, and which brought that year £314 in interest. As the Company had no statutory powers, he was advised that the Parliamentary Committee would say to them: "If you have been making over 10 per cent. profit, you ought to reduce the price to the consumer." He therefore took it that they would not recognize any profit over 10 per cent. on the capital. Now, 10 per cent. per annum on a capital of £20,000 was £2000 a year; and if 23 years' purchase were granted, it would mean £46,000 for the undertaking. The Redhill Company had parliamentary powers. Their capital was £62,500, on which 10 per cent. profit could be realized before any reduction need be made to the consumers. Of this, £8500 was still unissued. The Company was reported to be badly managed. Whether this was so or not he did not know; but it seemed strange that with two Companies in the same borough, one should make 17½ per cent. while the other had to resort to their reserve fund in order to make up the dividend of 10 per cent. He could not help thinking that if the same skilful treatment had been applied to the Redhill Company as had been bestowed upon the Reigate Company, and for which they were to be congratulated, the result would have been very different to the shareholders. He would take it that the Redhill Company would be awarded £5000 per annum net profits; and estimating the time allowed for purchase at 23 years, the price would come to £115,000. He might remark that the Company had been apparently economical in dismissing their Engineer in order to advance the profits. Taking the amount for the Redhill Company at £115,000, and that for the Reigate at £45,000, they had £160,000 as the purchase-money of the two undertakings. This money could be borrowed by the Corporation at 2¾ per cent., and the sinking fund would come to 1⅛ per cent.—altogether, it was just over 4 per cent. for the two, or £6600. Allowing £1000 for working capital, the amount payable yearly would be £7000. He had taken the Reigate profit at £3500, and the Redhill profit at £5000—making together £8500. Then there would be £1000 per annum saved in Directors' fees, and amalgamation of the staffs; making £2500 per annum profit to the Corporation. As the business developed, the profits would increase, and could be devoted either to the reduction of local taxation or the price of gas. Then he came to the strongest point of all. It was acknowledged by all the greatest authorities that private companies could not compete with corporations. These were the plain facts of the case. The advantages of having the gas undertakings under their own control could be summed up thus: They would get a better illuminant than at present, and a certain reduction in price; while the acquisition of the monopoly would result in benefit to the ratepayers.

The Ex-Mayor seconded the motion.

Alderman Markham contended that the Mayor had not put the cost high enough, and pointed out that there were now other projected schemes in the borough amounting to £325,050, which, at 3½ per cent. spread over 30 years, meant a yearly charge of £17,671 17s. 6d. He urged that it should be left for the ratepayers to decide the matter.

After some further remarks,

The Mayor briefly replied on the debate, and then put the resolution, which was carried with one dissentient.

It was decided to authorize the Parliamentary Committee to take the necessary steps to promote the Bill.

THE PROPOSED PURCHASE OF THE FALMOUTH GAS AND WATER WORKS.

A Lively Statutory Meeting.

A Statutory Meeting of the owners and ratepayers of Falmouth was held on Monday last week, to consider the proposal of the Corporation to purchase the undertakings of the Gas and Water Companies. The Mayor (Mr. C. Deeble) presided over a large audience.

The Mayor, in moving a resolution authorizing the promotion of a Bill, said the Corporation were nearly unanimous over the scheme. The doubts thrown on the purity of the water supply did a lot of harm to the reputation of Falmouth; besides which there was the question of the ability of the Water Company to maintain the supply. The Gas and Water Committee felt that they would be wanting in their duty to the ratepayers if they did not place this matter before them in its most serious aspect. As to the gas-works, the ten years during which the town had the privilege of acquiring the works under the Falmouth Gas Act were about to expire; and they felt it their duty to give the ratepayers an opportunity of deciding at such an important stage. The determination of the Gas Company to manufacture and supply carburetted water gas was to be deplored, because of the dangerous results which frequently followed, and because it was felt that the action of the Company would injure the reputation of the locality, and deprive them of visitors. They also advised the ratepayers to support the purchase scheme as a first step towards the relief of the rates. There were 200 places in which surplus profits from gas and water works were being applied in this way; and personally he was convinced that the acquisition of these works would be a good stroke of business. His Worship concluded by reading letters from various persons approving of the scheme; among them being one from his Honour Judge Granger, who expressed the opinion that every municipality ought to own its water supply, even if it caused an increase in the rates, while as regards the gas-works it seemed clear that even if there was no profit there would be no loss.

Dr. Harris seconded the motion, and said that if the scheme of Mr. Silverthorne (see *ante*, p. 929) would bear investigation—which he did not doubt—they would be standing in their own light and obstructing the future of the town if they failed to avail themselves of this opportunity.

Mr. J. Grose, Chairman of the Gas and Water Committee, rose to support the resolution. Up to this point the meeting had been orderly, except for the interjection of remarks and comments on the speeches. Mr. Grose was, however, subjected to a great deal of interruption; and at times the proceedings became uproarious. At one stage the Mayor directed the police to remove one of the opponents of the scheme who had made himself conspicuous by his interruptions; but they took no notice. In the course of his remarks, Mr. Grose said it was noticeable that combined Gas and Water Bills stood the best chance in Parliament. In this case there was no question about a Gas Bill passing, and they thought it best to associate the water with it. If they took advantage of the local Gas Act, the ratepayers would be relieved of immediate payment of the costs, which would be met by a short loan spread over ten years. [Mr. J. Burton: And throw us into bankruptcy.] The prospect of being able to relieve the rates by £600 or £700 a year was worth attention. If the gas-works were in the possession of the ratepayers, they would be able to effect a considerable reduction in the cost of lighting, cleaning, extinguishing, and repairing the public lamps. They would all agree that the decision to introduce carburetted water gas without even consulting the Corporation was a very improper step. [Mr. Burton: It is their own property.] He was informed that water gas was poisonous; and he believed the real motive of the Company in introducing it was to obviate the necessity of removing the works, which were nearly approaching the limits of their normal production. He hoped there would be a strong majority in favour of the scheme, in order that the best terms might be obtained. The ratepayers would never again have the opportunity they now had. [A Voice: We don't want it.] There could not be a more favourable time for purchase than the present, when they could avail themselves of the provisions of the Gas Act, and the Water Company were in the position of having paid no dividend on the ordinary stock for two years.

Mr. Phillips, another member of the Corporation, was about to continue the discussion as an opponent of the scheme, when the noise and confusion, which had increased during the latter part of Mr. Grose's speech, became still louder.

The Mayor appealed for order; but there was no cessation in the clamour. At last he announced his intention to put the resolution, which he forthwith did. Few hands were held up either for or against it; but the Mayor declared it carried.

A scene of disorder ensued, in the midst of which the Mayor left the chair and the platform; having first intimated that a poll had been demanded and would take place.

Mr. Burton afterwards took the chair.

Mr. Phillips spoke against the scheme, which he declared would mean an expenditure of £100,000, while they only had 4000 burgesses, of whom but 2000 paid rates.

Mr. Burton and other speakers denounced the scheme.

Mr. J. W. Buckley, the Engineer and Manager of the gas-works, referring to the attacks which had been made on the Company because of the introduction of water gas, said there were upwards of 60 works in Great Britain which were manufacturing water gas, and engineers had proved it to be one of the most successful and advanced systems of gas making.

Another vote was taken, with the result that only a few held up their hands for the resolution, and a very large number against it.

The Water Scheme for the Midlands.—An Association of District Councils has been formed in Derbyshire for purposes of water supply; the Provisional Committee consisting of representatives of Alvaston, Belper, Chapel-en-le-Frith, Ilkeston, Shardlow, Darley Dale, Bakewell, and Matlock. It is proposed to ask the promoters of the Derwent scheme to insert clauses in their Bill to enable District Councils, either separately or in combination, to be supplied, where practicable, from the main, on terms to be agreed upon.

CEARA GAS COMPANY, LIMITED.

The Annual Meeting of this Company was held last Friday, at the London Offices, No. 9, Queen Street Place, E.C.—Mr. Horatio Brothers in the chair.

The Secretary (Mr. T. Guyatt) read the notice convening the meeting, after which it was agreed to take as read the report and accounts, which were summarized in last week's issue.

The Chairman, in moving their adoption, said that, in going through the latter, he found that the expenditure during the past year, omitting the expenses of the London office, depreciation, debenture interest, and discounts, was £1653 more than for the previous year; but against this must be put the increase of £1716 in the gas-rental, and of upwards of £1000 on the bye-products and gas-fittings. Had it not been for the increase of £702 in the cost of the coal used, and the increase of £845 in the item of exchange, the balance-sheet would have been a very satisfactory one. But as it was, the net profit was £115 more than in the preceding year. The rate of exchange had improved somewhat of late, the cost of coal delivered had advanced by 4s. 3½d. per ton, and the price in the future was not likely to be any less. The production of gas per ton of coal carbonized during the year was a trifle lower than in 1897; but this, it was hoped, would be remedied by the adoption of improved means of carbonizing, which the Directors had sanctioned, and which they trusted would shortly be in operation. The increase in the consumption of gas both by the public lamps and by private consumers was very satisfactory, being about 10 per cent. The increase in the private consumption especially was very gratifying, and would be still more so if the payment was not in currency, or 8½d. per milrei of the nominal value of 27d. It was hoped, however, that the attempt of the incoming President to place the finances of Brazil on a sound basis would increase the value of the milrei as a factor in the item of exchange, and thereby render the private consumption of gas more profitable to the Company. In addition to their misfortune as to the low value of the milrei, by which they were paid by the private consumers, the Government, ignoring the Company's rights under the concession, persisted in increasing their taxation and otherwise adding to their burdens—disregarding all the remonstrances of the Directors as to their injustice. But they did not intend to let the matter rest, but would endeavour to bring the authorities to a sense of right and justice. But whether the Board would be successful in their endeavours remained to be seen. There had been an outlay of £1529 on capital account during the year. The total capital expenditure, less the amounts written off for depreciation, was £52,354. The total capital called up on the ordinary and preference shares was £44,710, and of debentures issued £7500—making in all £52,210, and leaving a balance for working capital of £144, which was practically of no use for such a purpose. The consequence was that the reserve fund of £5000 had been used instead of calling up further capital; but even this aid was now insufficient considering the large and expensive stocks of coal and other material the Directors were compelled to keep, in order to guard against any failure in the supply of gas. So that the money market on this side was often very tight. There was a balance of £4710 due on the 942 second preference shares; and it was very likely that some of it would have to be called up during the year, as the increasing consumption of gas necessitated further outlay. The Company had had the misfortune to lose the services of their Manager (Mr. T. M'Making), who had been with the Company for thirteen years. He retired on June 30 last, at his own wish, for domestic reasons. The Directors had appointed as his successor his assistant (Mr. Reid), who had been in the Company's service for eight years, and who had a good knowledge of the language and the people. In conclusion, the Chairman said that, looking to the prospects of the Company as a whole, he anticipated that, when the Directors again came before the shareholders at the next meeting, they would be able to give them a better dividend.

Mr. A. J. King seconded the motion, which was unanimously adopted.

A dividend of 5 per cent. on the preference shares, less income-tax, and 4 per cent. on the ordinary shares, tax free, having been declared,

On the motion of the Chairman, seconded by Mr. F. A. Wallroth, the retiring Directors (Messrs. J. Darell Blount and F. W. Brothers) were re-elected to their seats at the Board; and on the proposition of Mr. Skaife, seconded by the Rev. Charles Tabor Ackland, Mr. Magnus Ohren was re-appointed to the auditorship.

The customary votes of thanks were passed to the Chairman and Directors, to the Secretary, and to the late and present Managers. Mr. M'Making was present, and acknowledged the references which had been made to his services.

GAS V. ELECTRICITY FOR ASYLUM LIGHTING.

The Governors of the Cork District Lunatic Asylum have lately been considering the advisability of making a change in the lighting of the institution; and on Monday last week a meeting of a Special Committee of the Board was held to consider reports on the subject. It must be acknowledged that the Governors were desirous of being thoroughly well informed on this important matter; and the information laid before the Committee was full to a degree. The Resident Medical Superintendent (Dr. Oscar Woods) communicated with the superintending officials of thirty asylums in the United Kingdom, and put the following questions: (1) Is your asylum lighted with gas or electricity? (2) If by electricity, do you generate it on the asylum grounds or rent it from a company? If the former, (3) Do you use steam or gas as motive power for engines? (4) What is the number of lights in use and of units consumed annually? (5) What horse power of engine is required? (6) What is the cost per unit? (7) If you use gas, have you adopted incandescent burners; and, if so, are they a success? (8) Which light do you recommend for asylum purposes? (9) Do you use fans for ventilating purposes; if so, what do you use as motive power? These questions were answered by nearly all the officials to whom they were addressed; and Dr. Woods tabulated the replies. They showed that, in England, electricity is in use at Chester, Claybury, Dorset, and Hereford; and it is about to be introduced at Whittingham. Gas is used in all the other English asylums from which reports were

received. The Superintendent of the Kent Asylum alone preferred gas to electricity. Three Superintendents were silent on the subject; and all the others more or less strongly advocated electricity as being much safer, healthier, cleaner, and, in some instances, cheaper than gas. Incandescent burners are, on the whole, condemned for general use as being too fragile, only two Superintendents recommending them. Dr. Woods believed that two other asylums approved of incandescent burners; but the Superintendents had not replied to his circular. In Scotland, gas alone is used in the Argyle, the Murray (Perth), and the Fife Asylums; gas and electricity, at Aberdeen and Edinburgh; electricity, at Dumfries, Lanark, and Perth; and it is to be introduced in the Inverness and Midlothian Asylums. In Ireland, gas and electricity are in use in the Armagh Asylum; electricity is employed in the Killarney, Maryborough, and Mullingar Asylums, and it is about to be introduced in the Richmond Asylum. Of the remaining Irish asylums, all are lit by gas; but all the Superintendents save two recommend electric light, and all except two who had used incandescent burners said they were satisfactory.

The Governors decided to get estimates from the Cork Gas Consumers' Company and the Cork Electric Lighting Company. Dr. Woods accordingly prepared a series of questions which were sent to these Companies; and on the answers being received they were forwarded to Mr. Edmundson, of Dublin, the expert recommended by the Board of Control, who had previously reported to the Governors on the subject. Though his firm are engaged in the supply of both gas and electric light, making him specially qualified to speak on the merits of either, they were precluded from competing because he had undertaken to assist the Board. He was in attendance at the meeting, and presented his report, which was discussed paragraph by paragraph. The following total costs were arrived at: Gas by ordinary burners, £1528; gas by incandescent burners, £1439; electric light supplied by the Cork Company, £1740; electric light supplied by the Board's own plant, £1703. At the close of the discussion, the Chairman (Mr. J. W. Clery) remarked that, having made the inquiry, they were all of opinion that it was inexpedient at present to alter the lighting of the asylum. If they passed a resolution to this effect, it did not bind them in the future. The following resolution was passed: "That, having carefully examined into the relative cost of lighting and providing motive power at the asylum by gas and by electricity, and finding that it amounts, as estimated, in the case of electricity to £1740, in the case of gas for ordinary burners to £1528, and for incandescent burners to £1439, showing a difference in annual cost between the latter and electric light of £300, this Committee consider that, under the circumstances, it was inexpedient, at all events at present, to discontinue the lighting of the asylum by gas; and the Committee so recommend to the Board. The Committee further recommend that incandescent burners be introduced on trial to an extent to be decided by the House Committee and the Resident Medical Superintendent." In another resolution, the Committee expressed their pleasure at hearing the exhaustive and interesting report of Mr. Edmundson, and accorded him a vote of thanks for the material assistance he had rendered.

THE ELECTRIC LIGHTING SCHEME FOR ADELAIDE.

We have recently alluded to the electric lighting scheme for Adelaide, South Australia. As it presents some peculiar features, it may be of interest to give some particulars as to the positions of electric and gas lighting in the city.

In 1891, the Parliament of South Australia passed an Act authorizing local authorities to supply gas and electricity. For some considerable time the City Council of Adelaide sought to establish municipal electric light works; and in December, 1894, a poll of the ratepayers was taken, when 2255 voted for the scheme, and 3382 against it. In 1897, the South Australian Electric Light Company obtained an Act empowering them to carry on business; and clause 39 sets forth that, "except as to the Municipality of Port Adelaide, this Act shall only apply within the limits of such municipalities and districts the Councils of which shall by public notice notify that, as the result of a poll, the ratepayers have affirmed a resolution that it is desirable that this Act shall so apply." As the South Australian Gas Company supply gas in about twenty municipalities and councils' boundaries a good many polls may be required.

On September 17 a poll of the ratepayers of Adelaide was taken as to whether it was desirable that the Electric Light Company's Act should apply within the city. There are 10,756 ratepayers' names on the roll, but only 2761 (about one-fourth) voted. Of these, 1775 were in favour of the proposition, 959 against it, and 27 papers were informal. Less than one-sixth of the ratepayers voted for the proposition. Many of those who did vote were doubtless led to believe that competition in the supply of light would be to their advantage and so forth, as is usual in such contests.

The Adelaide Corporation have entered into a contract with the Electric Light Company as follows: The Corporation will not within ten years exercise their powers under the Corporation Electric Light Act of 1891. The Electric Light Company are to provide, erect, light, and maintain every night in the year, from sunset to sunrise, 30 arc lamps of 2000-candle power, for five years, for the sum of *one shilling per lamp per annum*, which is said to be a gift to the Corporation of £6500. The Company have to deposit £2000 with the Corporation and £5000 with the Treasurer of the province—together, £7000; and they pay the expense of the poll, which is rather a heavy item. They also pay to the Corporation all damages sustained by the failure or inability of the Company to carry out the contract, and pay the Corporation for each lamp not lit *and kept lighted ten shillings for each lamp each night*.

The scheme appears to be to light a two-chain street, 2½ miles long, by 30 arc lamps, each of 2000 nominal-candle power. As in London some arc lamps are 38 yards, and in other cities 70 and 80 yards, apart, in streets less than two chains wide, one may fairly wonder what the electric street lighting in Adelaide will be like. No provision appears to have been made as to the 30 arc lamps during the second five years, nor as to the removal or purchase of the Electric Light Company's plant, wires, &c., at the end of the ten years.

The following particulars with respect to the Company were filed in the Supreme Court of South Australia in April last: Capital, £20,000, in 1000 shares of £20 each; number taken up, 1000; calls made, £13,875; calls received, £13,655. The number of shareholders is 16—viz., Johnson and Phillips (London), engineers; Brookman's Gold Exploration and Finance Association of West Australia; W. W. Brawford, electrical engineer, Sydney; E. M. Grant, electrical engineer, Adelaide; F. C., Howard, Manager of the Electric Light Company, Adelaide; four of the Messrs. Brookman, and seven other shareholders.

Mr. Howard, in his evidence before the Select Committee on the Company's Bill in October, 1897, said: "We are at present negotiating in London for an increase of capital, which will be absolutely necessary." We should think it would; and it remains to be seen whether capitalists will be found in London to risk their money in such a venture, especially when local people will not have anything to do with it. In Melbourne, which is a much more promising field for the electricians, the electric light companies have not succeeded; and we believe there are few, if any, successful electric ventures of any importance in Australia.

With regard to the supplies of the other illuminant, the South Australian Gas Company are in a very strong position. From the local papers we learn that they have more than 300 shareholders, nearly all resident in the colony. Not only do they supply gas to the city of Adelaide and its suburbs, but they also have gas-works at six other towns in the colony. They have spent on plant and works at their seven stations £320,000; and they have reserve funds of £64,000, besides a balance of £14,553 carried forward in June last. The Company have, as remarked in a previous article on this subject, secured a contract to light the streets of Adelaide for five years from Sept. 1, 1897, to Sept. 1, 1902; and they now light about 900 lamps under its provisions. This contract, it will be observed, still has nearly four years to run.

Adelaide is a particularly difficult city to light cheaply, on account of the many miles of terraces, squares, and park lands, and also because of the very limited population, early closing of shops, long days, and short nights. In the city and suburbs, most of the shops and dwellings are small one-storey places, and the houses are many of them, especially in the suburbs, very scattered. A number of them have large blocks of land attached, and there is a considerable quantity of vacant land.

The Electric Light Company advertise that they are a local Company with £100,000 to spend. They are beginning in a way that appears to spell ruin to their shareholders, as the free lighting they start with will handicap them. The loss they thus make will have to be borne by their other customers, which will certainly not conduce to cheap electricity.

ELECTRIC LIGHTING NOTES.

For the purpose of extending the electrical cables into the residential part of the borough, and adding to the generating plant, the Dewsbury Town Council have decided to apply to the Local Government Board for sanction to the borrowing of £9060.

The Winsford District Council are considering the question of adopting an electric lighting scheme, the first installation of which is estimated to cost £7700. Notice has been given that at the next meeting a resolution will be moved authorizing an application to the Board of Trade for a Provisional Order.

The St. Anne's District Council have decided to retain possession of their Electric Lighting Order, and to call in an expert to advise them on the question of carrying out the powers which it confers. It is stated that £700 a year is paid for public lighting by gas; and with this sum £20,000 could be borrowed at 3 per cent.

An application by the Barnsley Town Council for power to borrow £25,000 for an installation of the electric light was under the consideration of Colonel W. Langton Coke, of the Local Government Board, at a public inquiry last Friday. It was stated that, at the outset, a plant would be laid down capable of supplying 6000 8-candle power lamps, and would be so arranged that its capacity could be doubled by the expenditure of £2500 in additional plant and buildings.

Yesterday week the formal opening took place of the new electric lighting station erected in Sculcoates Lane, Hull, to supply a large portion of the city west of the River Hull and outside the old town. The cost of the new station has been about £40,000; and there are nine miles of new mains. To generate the electricity four steam dynamos of 760-horse power have been provided; and these will supply current at 2000 to 2500 volts. The Mayor (Alderman P. T. Crook) presided at the opening ceremony, and presented a gold key to Mr. Skinner (the Chairman of the Electric Lighting Committee), who opened the door of the premises.

A statement of the accounts of the unfortunate Morecambe Electric Light and Power Company (which is in liquidation) has just been issued to the shareholders. It shows that the receipts since the extraordinary meeting in February, 1896, amount to £3423; the principal item being £2718 from the District Council for the plant and undertaking. The expenditure amounts to £3422; leaving a balance of 17s. 9d. The holders of "A" debenture bonds will be paid in full, absorbing £2052; and the holders of "B" debenture bonds will receive 3s. 5¼d. in the pound. There are no assets available for either unsecured creditors or ordinary shareholders.

Dealing with the subject of electric lighting losses in Switzerland, the correspondent of the "Financial News" at Zurich last Thursday sent to our contemporary the following particulars: "The Compagnie de l'Industrie Electrique of Geneva, which was founded originally with a capital of 2,500,000 frs., closes its working year 1897-8 with a profit of 1038 frs., against 18,060 frs. in the previous year. This unsatisfactory result is due to the Genoa branch establishment, which shows losses to a total amount of 112,028 frs., against a profit of 17,631 frs. in 1896. Consequently, the Directors, authorized by the shareholders, have decided upon the winding up of the Genoa branch, in order to prevent the recurrence of such misfortunes in the future working of the Company."

About 7.30 p.m. on Saturday, the 22nd ult., there was a failure in the supply of electricity at Wolverhampton. The private consumers were without the light until 9.10 p.m.; but it was 10.30 p.m. before the public thoroughfares were re-lit. The cause of the breakdown as given by Mr. Shawfield, the Electrical Engineer to the Corporation, was "the failure of two generator armatures at the main station." The local correspondent of the "Electrical Review" says this is the third or fourth breakdown

of the kind that has occurred, but happily there is not much chance of another similar collapse; a new scheme recently foreshadowed by the Lighting Committee of the Corporation having been specially designed to obviate the risk of any such breakdown as this.

A good deal of inconvenience was experienced in Cambridge, on the evening of Saturday, the 22nd ult., through the partial failure of the electric light. On one circuit there was a complete breakdown for upwards of an hour. Several large firms were consequently deprived of light at the busiest time of the day; and the loss of business must have been rather serious. Fortunately in the case of the theatre the mishap occurred some time before the rising of the curtain, but the audience assembled when the building was lighted with oil-lamps and gas. The unexpected stoppage of the illuminant also interfered with the services in one or two college chapels; and some fun was caused when it suddenly went out in the dining-halls. The light in the Central Library (supplied through another circuit) flickered for a time, but did not go out.

Very important developments in connection with the electric undertaking are projected at Bolton, principal among which is the application of electricity as the motive power for the tramcars. This, of course, will involve some considerable extensions at the Corporation electric lighting station, the present capacity of which is 32,000 8-candle power lamps. The consumers at present number 446; and they have an equivalent of 34,437 8-candle power lamps fixed. Several other premises are also nearly ready for connection. To provide for the extensions of light and the motive power for the tramcars, new plant is required. To accommodate this, the engine-room and boiler-house will have to be extended by 86 feet. The new plant to be laid down is as follows: Two engines of 1000-horse power each, driving 600 kilowatt dynamos, and two of 500-horse power each, driving 300 kilowatt dynamos; four boilers, a battery of economizers, and the necessary pumps. The system of propulsion for the electric tramcars, for which 1000-horse power will be needed, will be the overhead trolley system; and seventy cars are to be put in operation. The total cost of the various undertakings included in the scheme will be above £200,000.

At a special meeting held last Tuesday, the Walker District Council had before them the question of electric lighting. The Rev. F. H. Berry moved—"That application be made to the Board of Trade for a Provisional Order under the Electric Lighting Acts, 1882 and 1888, to authorize the Urban District Council to supply electricity for public and private purposes, as defined by the Electric Lighting Acts, within the urban district of Walker." He explained that the matter arose out of an application of the Gas Company to promote a Bill to empower them to provide electric energy for the district. The Board thought, however, that it would be better not to have the two competing interests of gas and electricity in the hands of one Company; and therefore they considered it would be better to put themselves in the position of being able to command terms from any authority that would undertake to provide electricity. Colonel Crawford, in opposing the resolution, said the action of the Council in this matter was unnecessary and unfriendly. It was unnecessary because the question of the electric lighting of that district had been under the consideration of local gentlemen for some years. Action had been taken by the Gas Company, with which he himself was connected—a Company who from his experience had for years met the wants of the district in a way that very few companies of a similar character had succeeded in doing. Independently of supplying the wants of the various private consumers large and small, they had at present some 2450 slot-meters to meet the wants of the smaller consumers. Thus, it could not be said that the Company were in any way neglectful of the requirements of the district. The Council's action was unnecessary, because they still had the power to make terms with the Company. He maintained that until the Company applied to the Council for sanction to a Provisional Order, the Council had taken no action in the matter. They could not, therefore, claim credit to themselves for having initiated the scheme. The resolution was carried with one dissentient—Colonel Crawford. Thereupon this gentleman said he must sever his connection with the Council; but subsequently, at the request of the members, he agreed to take time to consider the matter.

We recorded last week the accident which plunged Brighton into darkness on the night of Thursday, the 20th ult. As the machinery and plant at the electric light works are all of the latest type, such a catastrophe should have been impossible. The following is the explanation given of the cause of the occurrence: The cessation of the light was caused by the heating and ignition of an armature, coupled with the failure of the automatic cut-out to perform its task of throwing the damaged dynamo out of the circuit; the dynamo in question being one of the exceedingly powerful machines put down between two and three years ago. At the time of the breakdown, six dynamos were at work, and the cut-out should not only have automatically separated the one concerned from the others as soon as it ceased to supply current, but should also have announced by a loud click the fact that a mishap had occurred. These instruments are practically tested every day when the dynamos are shut down; and any failure on their part to act could not possibly escape notice. As, therefore, it must be assumed that the cut-out was efficient up to the moment before the breakdown, the failure can only be attributed to the sudden enormous pressure of current, and the consequent burning of the metal (which was very evident on examination) preventing the free working of the mechanism. At the time of the breakdown, Mr. Arthur Wright, the Corporation Electrical Engineer, was close to the works; and he was very soon on the spot investigating the cause of the failure. But, unfortunately, it was for some time impossible to trace it. In the works themselves, no gas lights are in use; and there was utter darkness, except for the glow of the furnaces. Moreover, when the fault had been located, and the injured generator put out of circuit, the remaining dynamos failed for some minutes to respond to the enormous demand made upon them, and had, so to speak, to be coaxed with lighter loads before they would perform their work. Everything possible was done to limit the period of inconvenience. The advantage of retaining a supply of gas with an electric light installation was evident at several of the places of amusement. At the Empire, very little difficulty was caused; gas lights being available for both auditorium and footlights. The same remark applies to the Alhambra. At the Eden Theatre also the inconvenience experienced was very slight. Gas as well as electric light is utilized for illuminating the theatre; and both were in use when the electric current failed. The curtain had just been lowered at the close of an act; and though the supply of gas only dimly lighted the building, it was not found necessary to prolong the usual interval.

Mr. F. H. Tullock lately held an inquiry on behalf of the Local Government Board into the proposal of the Hastings Corporation to borrow £58,000 for the purpose of acquiring the undertaking of the Electric Light Company. Mr. Macmorran, Q.C., and Mr. Pritchard appeared in support of the application; Mr. Freeman, Q.C., and Mr. S. G. Lushington opposed on behalf of the ratepayers; while Mr. J. Macer Wright, Mr. Botley, jun., and Mr. Bailey also gave notice of opposition. Mr. Macmorran said the Company, which was incorporated in 1882 with a capital of £50,000, were not anxious to dispose of their undertaking. This was in consequence of their having had a good year, and also on account of there being every prospect of continued prosperity. The question really appeared to be whether the £58,000 asked was an exorbitant sum. The Town Clerk (Mr. B. F. Meadows), cross-examined by Mr. Freeman, said he believed the authorized capital of the Company was £50,000. He was not sure, but he was under the impression that £27,220 of share capital had been subscribed. The Council sought the advice of Professor Robinson, whose opinion was that the undertaking was worth £40,000. Dr. Allfrey and Mr. Burrell, two members of the Corporation, were decidedly of opinion that in acquiring the undertaking the Council would get a remunerative concern. Mr. L. Andrews, the Manager at the electric light works, said the whole of the plant, with the exception of a few pumps, had been put in since 1890, and was in as good condition now as it was then. Mr. W. Hammond said he valued the concern at a much higher rate than Professor Robinson. He considered the price at Hastings a very fair one; and he could prophesy good results to the Corporation. Mr. Freeman, speaking on behalf of the Gas Company as ratepayers, said that if the electric light undertaking could be purchased on reasonable conditions, all objections would be immediately withdrawn; but the bargain made was a reckless one, and not for the good of the town. He held that the Corporation might wait until the Company's Order lapsed, at the end of the 42 years for which it was granted, when it would be in their power to purchase the works as a going concern, without any allowance for goodwill, profits, and compulsory sale. The Corporation would have to compete with the Gas Company; and it appeared to him that the whole basis upon which they had gone was radically wrong, and the bargain would not be for the benefit of the ratepayers. If £40,000 was a fair price, why should the Corporation throw away £14,000 or £15,000 merely that they might have one more undertaking under their control? He did not object to a fair price, but he did say that it was unreasonable to the ratepayers that the thing should have been rushed through in the way it had been. Mr. Macer Wright objected to the acquisition of the works at an exorbitant price. Mr. Macmorran, in reply, held that Professor Robinson in his report had not said a word to the effect that the plant was in any way weak or inefficient. It was in good working order, and was capable of turning out all the work required, which was increasing. Because the electric light business was flourishing, it was no reason why the Company should be asked to sell at a valuation. The Corporation wished to buy because they saw the Company had got their heads above water, and were doing an increasing business. He urged that the loan should extend over 25 years. The inquiry then closed.

An inquiry of considerable importance in connection with the Manchester Corporation electric lighting undertaking was held by Major-General H. D. Crozier yesterday week. It referred to an application by the Council for sanction to borrow an additional £200,000 for the purposes of the department. The case for the Corporation was stated by the Deputy Town Clerk (Mr. Hudson). He said that although the electrical undertaking had only been in existence a little over five years, there were 214,946 eight-candle lamps connected; and there were 31,760 lamps waiting for connection. The Corporation would not be able to take on the latter until plant which had been authorized by the Local Government Board, and was now being constructed, had come into operation. The charges for electrical current were 5d. per unit, fixed charge; and for long-hours consumers 1½d. per unit, and £7 per annum per kilowatt. These prices compared very favourably with those of any other undertaking in the United Kingdom. During the time that had elapsed from the initiation of the undertaking until March last, the Electricity Committee had placed to reserve and renewal funds £34,245, and had handed over to the city fund £26,694; making a total of £60,939, which for the period over which it extended was equal to a rate of rather more than a penny in the pound. This indicated that the undertaking had been a marked success—a success which had not resulted in any sense in damage to the gas undertaking. In connection with the gas-works, the Corporation had been able to hand over to the ratepayers yearly sums of money which had been equivalent to a rate of more than 4d. in the pound. This had been done at a time when the price of gas had also been reduced. The price of gas was at present 2s. 3d. per 1000 cubic feet within the city and 2s. 6d. outside. In regard to the water and gas supply and other matters, there was a community of interest between the city and the surrounding urban districts; and there was a demand that Manchester should supply those districts with current for lighting and also for tram traction. The Corporation had made definite arrangements for supplying electrical current, under the powers they possessed, to Levenshulme, Moss Side, Withington, and Heaton Norris; but as the last-named place had not yet obtained an Order, it was not possible to take any immediate action so far as that township was concerned. Meanwhile the main purpose of the application now made had reference to the supply of electricity to Levenshulme, Moss Side, and Withington. The price in the outside districts would be precisely the same as that charged in the city. Of the £200,000, it was estimated that £116,558 would be required within the city, £52,332 in the Withington district, £16,002 in Moss Side, and £9400 in Levenshulme. Alderman Higginbottom, the Chairman of the Electricity Committee, in support of the application, stated that, in accordance with the terms of the agreements entered into with Moss Side, Levenshulme, and Withington, the compulsory streets mentioned in their Orders had to be lighted by the Corporation within a term of two years from Aug. 6, 1897. It was absolutely necessary, therefore, that the works should be at once proceeded with. The Council had also instructed the Committee to light up a large number of the principal thoroughfares in the city with arc lamps, if possible during this winter. The expenditure on this item would be £11,500; and this was included in the application. The posts

carrying the arc lamps would be about 43 yards apart, placed alternately on opposite sides of the streets. The Corporation, having obtained power to work the tramways by electricity, had decided that they should be equipped and ready for running in April, 1901; and it was probable that the overhead system of traction would be employed. The capital expenditure incurred to the end of March last was £357,617. In December, 1893, there were 289 consumers, using the equivalent of 32,716 eight-candle lamps; while on Oct. 20 this year, there were 2281 consumers, using 214,946 lamps. When the applicants now waiting for a supply had been dealt with, the total number of consumers would be 2411; and the number of lamps would be 246,706. Mr. C. H. Wordingham submitted a long report on the subject of the extensions; and this concluded the evidence.

THE LONDON COUNTY COUNCIL AND THE WATER QUESTION.

The Water Committee's Report.

In the "JOURNAL" last week we gave the recommendations of the Water Committee of the London County Council in regard to the acquisition of the undertakings of the eight Water Companies and to the provision of an additional supply of water for the Metropolis. As then stated, they formed the conclusions of a report to be considered by the Council at their meeting to-day. The full text of the document is as follows:—

Proposals for Legislation in 1899.

It will be remembered that in May last we brought up a report to the Council stating that, owing to the continuance of the sitting of the Royal Commission on London Water Supply, we did not deem it advisable at that moment to make any proposals for legislation on the subject of water, but that in our opinion it would be well for the Council to suspend its Standing Orders so as to leave us free after the summer recess to make any recommendations that might appear to be necessary. The Council, therefore, has now to consider whether it will continue to wait for the report of the Royal Commission before taking any action in the direction of legislation, or whether it will at once formulate its proposals and lay them before Parliament in the coming session.

In considering this question, it must be borne in mind that if no action is taken by the Council now, it will be unable to promote any legislation before the year 1900. On the other hand, there seems to be no reason why the Royal Commission should not make its report early in 1899, so that it may be in the hands of Parliament before legislating on the subject. In any event, in view of the very serious state of affairs that has been shown to exist during the last few months, we believe that it is the duty of the Council to take every possible step to enable the Legislature to have before it, in the coming session, specific proposals for solving the problem of the London Water Supply upon the lines of the Council's policy.

There are two main facts appearing from the experience of the last twelve months, and these affect the question as to what legislation is necessary in two different manners. First, there is the fact that one-quarter of the population of London has recently been subjected to a series of water famines by reason of the default of the East London Water Company; and, secondly, there is the fact that the drought of the present year has reduced the flow of the Rivers Thames and Lea to so low a state as to make it certain that these rivers cannot, in a dry year, yield the supply which the Royal Commission, presided over by Lord Balfour of Burleigh, relied upon in making their report. These two matters, although closely connected, may, for the purposes of discussion, be kept distinct, because it is possible by temporary measures to satisfy the needs of East London immediately, whereas it will take ten or fifteen years to carry out the necessary works for providing for the permanent requirements of London generally.

Immediate Remedies.

We believe that the only really satisfactory means of immediately remedying the state of affairs in East London lies in pressing forward the old policy of the Council—namely, the acquisition of the eight Metropolitan Water Companies. If the Council's Bills of 1895 had become law, there would have been no water famine in East London in the present year. The Council would have come into possession of all the undertakings in 1896, and would have been able with little difficulty to utilize for East London the water generally available for the Metropolis, of which there has been sufficient even during the present drought. Any scheme which contemplates the continuance of the individual Companies is open to the objection that each Company possessing a margin of available water will naturally desire to retain such margin for the possible needs of its own consumers. It is only by uniform management that the whole of the water available for the Metropolis can be efficiently made use of for all parts of the area. Although schemes of amalgamation or of combination of the Companies have been put forward as capable of effecting this object, they are attended by so many difficulties, and are open to so great objections, that we are convinced that the only satisfactory system of uniform management lies in a public authority possessing the entire supply. We propose, therefore, legislation upon the lines of the Council's Purchase Bills, subject to the following observations.

The Council's Bills have always provided for the immediate transfer of the Companies' undertakings, with subsequent arbitration as to price. This proposal has been the subject of some criticism; but we believe it to be indispensable under the pressing circumstances of the case, and quite capable of justification when accompanied, as it has been, by provisions assuring the shareholders against loss of income during the interval between the transfer and the payment of the purchase-money. The actual vesting of the undertakings in the Council cannot prejudice the shareholders, nor do we wish it to prejudice the question of the future position of the outside areas; and we therefore propose a resolution which makes this clear.

A question arises as to whether the Council should on this occasion promote eight separate Bills or one Bill. The plan of proceeding by separate Bills was adopted formerly for reasons of parliamentary expediency; but the consideration which the subject underwent in 1895 should operate so as to shorten the period of discussion in the coming session, and make it possible on this occasion to unite the proposals for purchase in one Bill. This course will have the additional advantage of placing it beyond all doubt that the Council's scheme is one for unification of supply, and therefore capable of providing for the immediate necessities of East London. We propose that the Council shall proceed by one Bill for the purchase of all the Companies.

In order to make the Council's proposal a complete and immediate protection against further famines in East London or elsewhere, we suggest that the Bill should contain clauses enabling the Council to take in hand forthwith the work of consolidating the several systems, and connecting and laying mains, &c., so that the whole may be at the earliest possible moment adapted to meet the needs of all parts of the Metropolis. The power of constructing such works would be similar to that under which the Council construct sewers.

The precise form of the arbitration clause may be left to be considered by the Parliamentary Committee; and we suggest that the Council should at the present moment only pass a general resolution on the subject. But for this purpose it may be well to remind the Council of the facts connected with the arbitration clause in former Bills. The clause as originally presented in 1895 to Parliament rendered it obligatory upon the arbitrator to have regard to various specified matters—such as, for instance, the condition of the works, the adequacy of the supply, the necessity for new sources of supply, &c.; and it further enacted that no allowance was to be made for any claim to make up back-dividends for more than six years, or in respect of compulsory sale.

When this clause came before Mr. Plunket's Committee, it appeared clear that it was impossible to expect Parliament to enter into the numerous technical questions involved in so detailed a proposal; and, acting upon a suggestion of that Committee, the Council substituted what has since been known as the Plunket clause, the practical operation of which would have been to place the arbitrator in the position of the Committee of Parliament, and so enable the Council to urge before him all the contentions which it was at that time prepared to submit to the Committee.

The Council's Bills having been rejected in 1896, were reintroduced in 1897; but the arbitration clause was slightly altered. It was based on the Plunket clause; but the obligation upon the arbitrator was not quite so clearly defined as before. It contained, however, an absolute prohibition against any allowance being made in respect of compulsory sale, except in so far as would cover the cost of re-investment.

The views of the Council throughout have been that, while prepared to pay the fair and reasonable value of the water undertakings, such value ought only to be decided with due regard to many important matters. One of these matters was the contention then put forward by the Council that the Companies were rapidly nearing the end of their resources, and would shortly come face to face with a very large expenditure, necessary for procuring an additional supply. The experience since gained has entirely borne out this view. In the last three years, all the Companies, except the Kent Company, have been to Parliament for additional powers; and the default of the East London Company is a matter of notoriety. The Council's action in this respect therefore appears to have been fully justified with respect to one of its contentions, and it can, we think, fairly maintain its demand for a special arbitration clause.

Our present proposal is that the arbitration clause shall be drafted in such form that it shall be certain that under it, in fixing the price to be paid for the undertakings, the arbitrator will, in the case of each Company, have regard to all such circumstances as may be brought before him—such as, for instance, in the case of the East London Company, its inability to provide for its population, and the necessity of its obtaining other supplies. The clause should also provide specifically that no addition shall be made in respect of compulsory sale, except so far as to meet the cost of reinvestment (if any).

The question of dealing with the outside areas is naturally one of difficulty; but the Council has already on other occasions agreed to the principle of according to the outside authorities the same freedom of administering their own supply as the Council claims for itself. This, however, is a matter which concerns the outside authorities more than the Council; and so far as the Council is concerned, we think the Bill might be drafted on the lines of the Bills of 1895, the effect of which would be that the Council would take over all the responsibilities of the Companies as regards obtaining water necessary for the entire area, and would transfer to the outside authorities, if they so desired, all the works and powers of distribution in their respective districts. The further question, as regards the separation of sources, may be left over for negotiation with the outside authorities, especially as this question is one of those on which the Royal Commission will undoubtedly report, and with which Parliament may possibly deal separately at a later period.

There remains one more question—that of the Council's agreement with the City to give one-eighth of the seats on the Council's future Water Committee to nominees of the Corporation. We are not sure how far the Corporation have abandoned their views in favour of purchase; the evidence put forward by them before the Royal Commission being somewhat uncertain. If, however, they still support the principle of purchase, we think the Council is bound to adhere to its arrangement; and we suggest that the Corporation should be asked at once whether they will assist the Council on the lines of the old agreement.

Future Supply of London.

We have stated that the question of the East London Company and that of the future supply of the Metropolis may be kept distinct; but at the same time the peculiar circumstances of this year have affected the larger question to so great an extent, that it seems impossible for the Council to avoid laying before Parliament in the coming session its proposals with reference to this matter also.

It will be remembered that the conclusion arrived at by Lord Balfour's Commission, that sufficient water to satisfy the requirements of London up to the year 1931 could be obtained from the valleys of the Thames and the Lea, was based upon the view that these valleys could be relied upon to yield at least an average daily supply of 300 million gallons and 92½ million gallons respectively. Although from the outset entertaining grave doubts as to the correctness of this view, we have hitherto accepted it, and devoted our attention specially to the question of the cost of a storage system necessary for giving such supply, as compared with the cost of bringing water from Wales; and having become convinced that

the storage scheme would prove in the end the most costly and least satisfactory of the two, we tendered evidence before the present Royal Commission, to show that reservoirs at Staines capable of supplying 300 million gallons a day, without depletion of the Thames in dry years, must be very large and very costly. The present year has been drier than any previous year in recent times; and it is evident now that a reservoir system capable of meeting the needs of a year such as 1898 must be of such magnitude as practically puts all storage schemes out of the question.

But, beyond this, the experience gained in connection with the flow of the Rivers Lea and Thames during the present season has entirely confirmed us in our belief that Lord Balfour's Commission were misled into erroneous views as to the quantity of water obtainable in dry years. The report of the Commission with regard to the Lea was undoubtedly based to a great extent upon the evidence given on behalf of the East London and the New River Companies. This evidence was that between them they could supply over 110 million gallons a day, and that this quantity could be largely increased by storage reservoirs in the Lea Valley. Since then the New River Company have admitted that they can obtain from their wells only 24 million gallons a day instead of 34 million gallons as stated to Lord Balfour's Commission; and the East London Company, though they have doubled the capacity of their storage reservoirs, have nevertheless made default. The fact is that during the whole of the present year the entire volume of the River Lea has been used, and yet there has been a famine. Moreover, the average flow in September last over Field's Weir was only 8¼ million gallons a day (of which it is believed a large proportion was water contributed by the New River Company); whereas the information before Lord Balfour's Commission was to the effect that the minimum known flow of the river for any month at that spot was 17½ million gallons. With regard to the Thames, the information before the Commission showed that its minimum total flow in one month was 308 million gallons a day. Last August the flow was only 272 million gallons; and in September it dropped to about 200 million gallons, out of which the Thames Companies had the right to abstract 150½ million gallons, and did, in fact, in August draw 129,900,000 gallons. These facts have convinced us that it is impossible to depend in a very dry year upon the quantity of water the Commissioners reported as being obtainable; and, if this is so, their report affords no solution of the problem of Metropolitan Water Supply.

The evidence of the present year therefore seems to justify conclusively the views hitherto held by the Council as to the necessity of immediately proceeding with some scheme for the future supply of the Metropolis on lines other than those suggested by Lord Balfour's Commission. The Council has already decided that, in its opinion, the solution lies in having resort to the Welsh mountains to obtain the necessary supplementary supply; and the time has now arrived for giving effect to this resolution. Our report upon this subject, discussed at the Council on Feb. 25 and April 21, 1896, gave a detailed statement of our entire proposals; and thereupon the Council resolved that the requisite augmentation of the supplies of water should be derived from some other source than the Thames and Lea; that the valleys of the Usk, the Wye, and the Towy would furnish a suitable area from which supplies might be derived; and that the Usk section should be undertaken in the first instance. After passing these resolutions, however, delay was incurred by reason of the Council desiring further advice from Sir B. Baker and Mr. Deacon; and although in 1897 these Engineers reported in favour of the Welsh scheme as compared with that of storage in the Thames Valley, by that time the present Royal Commission had been appointed by the Government, and thus we again felt ourselves unable to recommend the Council to take parliamentary action. We proceeded nevertheless with the plans and sections; and these have all been completed for both portions of the Welsh scheme. The work that remains to be done in order to lay complete proposals before Parliament will take about three months to execute. But the referencing for the portion of land taken for the reservoirs, &c., can be completed in proper time; and it should not be impossible, if the referencing for the conduits is finished before Parliament meets, to obtain a suspension of Standing Orders so as to enable Parliament to have the scheme properly before it.

We therefore propose that the Council should deposit a Bill for obtaining water from Wales; but in doing so we advise the Council to make an alteration in its former resolution. The Welsh scheme, as approved in 1896, was divided into two parts—namely, the Usk section and the Wye section. We then advised the Council to take up the Usk section in the first instance; but since that date Sir B. Baker and Mr. Deacon have expressed a preference in favour of the Wye section. The reasons which actuated us in recommending the former were purely reasons of policy; and as the Engineer himself has throughout preferred to put forward the Wye section first, and recommends it now strongly as being the better and the cheaper of the two, we think the Council would do well to rescind its former resolution, and order a Bill to be promoted for obtaining water from the valleys of the Wye and Towy, upon the lines set out in our former report with reference to that portion of the Engineer's scheme. The estimate of cost in our former report has been slightly reduced, the total amount necessary for providing a daily supply of 200 million gallons being £16,546,000; and this will probably be expended in three instalments. We recommend—

1.—That a Bill be promoted in the coming session of Parliament for the purchase by the Council of the undertakings of the eight Metropolitan Water Companies, by agreement, or failing agreement by compulsion.

2.—That, subject to such provision as may be made by Parliament as to the ultimate relationship between London and the outside authorities, provision be made for the undertakings of the Companies vesting in the Council at a date not later than six months after the passing of the Act.

3.—That the Bill contain provisions authorizing the Council to proceed forthwith with the connecting and laying of mains and other works necessary in order to enable it to protect any part of the Metropolis from want of water.

4.—That the arbitration clause be so framed as to render it certain that in the case of each Company the arbitrator will have regard to all such circumstances as may be brought before him, and that no allowance shall be made in respect of compulsory sale except for cost of reinvestment (if any).

5.—That, subject to further negotiation thereon with the Local Authorities, the clauses with respect to the supply of outside areas should follow the principle of the Bills promoted by the Council in 1895.

6.—That the understanding with the Corporation of the City of London, with regard to their representation on the Water Committee, be adhered to, if they so desire.

7.—That a Bill (or Bills) be promoted in the coming session of Parliament for the purpose of empowering the Council to bring an additional supply of water to London from the watersheds of the Wye and Towy on the general lines of the report of the Water Committee approved by the Council, April 21, 1896, in so far as it applies to the Wye section of the Engineer's scheme.

8.—That it be referred to the Parliamentary Committee to prepare and present to the Council the necessary Bills for carrying out the above resolutions.

With a view of affording the Council every information on the subject of the Welsh scheme, we have directed copies of our report, dated Jan. 31, 1896, with the proceedings thereon, to be circulated to the Council, together with the report of Sir B. Baker and Mr. Deacon on the Chief Engineer's report with respect to the Welsh sources of supply.*

When the above report comes on for consideration to-day, Lord Onslow will move the following amendments: "That recommendation 1 be referred back to the Committee, inasmuch as Parliament cannot be expected to deal with the whole question of the London Water Supply pending a report of the Royal Commission which has been appointed to consider the subject, and only useless expense will be incurred by the promotion of any Bill framed without due consideration of the recommendations of that Commission; but that, as it is a matter of great urgency that provision should be made at the earliest possible moment against a recurrence of the scarcity of water in one part of London while in other parts there is more than a sufficiency, the Council do promote a Bill providing that any Metropolitan Water Company be required, in case of emergency, to supply water to any other such Company whose supply may be deficient, and providing for the connection of the reservoirs and mains of the several Companies for facilitating arrangements for this purpose. That, in view of the urgency of the matter, application be made to Parliament for the suspension, if necessary, of Standing Orders, so as to admit of the introduction of the Bill, as was done in the case of the Southwark and Vauxhall Water Company's Bill of 1897. That, therefore, the preparation of a Bill for the purchase of the Water Companies' undertakings be deferred until it can be seen how far the Council can harmonize its policy with the views of the Royal Commission; and that it be an instruction to the Committee to take that report into consideration as soon as issued, and advise the Council, without delay, what steps should then be taken to deal with the supply of water to London."

At the Meeting of the Council last Tuesday, it was resolved—"That it be an instruction to the Water Committee to consider and report as to the best means of compelling the London Water Companies to bear the cost of conveying the water from their mains to the houses, buildings, &c., of the consumers."

THE PROJECTED WELSH WATER SUPPLY SCHEME FOR LONDON.

The Report of Sir B. Baker and Mr. G. F. Deacon.

(*Continued from p.* 877.)

In the third part of their report, the Engineers deal with the supply of water from the Thames, and discuss at some length the scheme of storage reservoirs at Staines, which was commenced in the spring of the present year, under the provisions of the Staines Reservoirs Act, 1896. The Engineers were requested to report as to the practicability and cost of carrying out schemes of storage for providing 200, 300, and 400 million gallons of water per day from the Thames, on the lines of the suggestion contained in the report of the Royal Commission of 1893. As laid before that body, the above-named project was limited to 300 million gallons a day; and the main conclusion drawn by the Commissioners was as follows: "We think that regulations could be framed under which the quantity we suggest could be taken, not only without reducing the flow of the river on the rare occasions of exceptional drought to the present minimum, but in such a way as to secure that the volume of water left in the river at these times would be substantially greater than it is under existing conditions." The Engineers made themselves familiar with the areas of the proposed reservoirs, which, as regards their physical features, they consider to be entirely suitable; and they divided their inquiry and observations as follows: "(1) Concerning the sufficiency or otherwise of the works included in the project as laid before the Royal Commission, to yield stored water to the extent and at the times intended by the projectors up to 300 million gallons a day, and the application of the same conditions to the supply of 400 million gallons a day. (2) Concerning the extent to which, when the several expenditures have been incurred, the scheme will be efficient (*a*) as regards the condition of the supply at those times when the water would be sent to the filters direct from the Thames, and (*b*) as regards the influence of the project upon the flow of the Thames." Dealing first with the question of sufficiency, the Engineers report as follows:—

The intention of the scheme as laid before the Royal Commission was to provide storage reservoirs near Staines, and "the complete scheme," to use the words of the Royal Commission, "is intended to provide for the taking of 300 million gallons a day for supply, and still to leave 200 millions to flow over Teddington Weir." It is to be observed that the Royal Commission came to the conclusion that the gaugings at Teddington Weir were inaccurate. With this we agree; but we fear they do not afford any trustworthy data for an adjustment, which can only be effected by the adoption of material changes in the mode of gauging. Moreover, we know what the nominal 200 or 300 millions at Teddington means in other parts of the river; and all our remarks will apply to whatever actual figures those nominal quantities are in future found to represent.

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* Portions of this report have already appeared in the "JOURNAL" (*ante*, pp. 828, 876); and a further instalment is given to-day.

It is further stated in the report of the Commission, that "it is proposed that no water shall be taken from the river during the first 15 days of any flood; and the pumping charges have been made out on the assumption that four of such floods may occur in a year, and that the water drawn from store during the 15 days shall be replaced again by pumping in 20 days." On reference to the statement of Messrs. Hunter and Fraser, we find that the definition of a *flood* is a flow of 2300 million gallons a day at Teddington Weir.

The conditions, therefore, as laid before the Royal Commission, may be shortly summarized as follows: A volume of 300 million gallons a day to be drawn for filtration and supply (*a*) direct from the river, except during the first 15 days of a flood exceeding 2300 million gallons a day at Teddington, and to such an extent only as will not reduce the flow of the river below 200 million gallons a day; and (*b*) at all times not available for drawing wholly or partly from the river under (*a*), the whole or necessary portion of the water to be drawn from storage reservoirs, 40 feet deep, the lower 10 feet to be charged from the river by gravitation, the upper 30 feet by pumping, the pumping power being sufficient to return to the reservoirs in 20 days the volume provided to be drawn from them during the first 15 days of any flood.

It is desirable in the first instance to test the scheme by assuming it to be in operation during a year of low rainfall, and then to ascertain whether the storage so determined will suffice for years in which great floods occur. The year 1893, in which the report of the Commission was made, was a year of drought, and may be conveniently used for the first purpose. The supplies dealt with by the projectors are 184, 235, and 300 million gallons per day respectively, and for these supplies the total storage given is 6000, 10,000, and 18,000 million gallons. On the same basis, for a supply of 200 millions, a storage of 7000 to 8000 millions would be required. But we find that if the excess of the dry-summer supply over the mean for the year, which amounts during the period of pumping from stock to 5·6 per cent., be added, and if a proper allowance be made for unavailable bottom water, and a proper reserve for cleansing and repairs, a total reservoir capacity of at least 10,000 million gallons would have been necessary during the drought of 1893. In order to provide an average supply during the same year of 300 million gallons a day, 311·8 millions per day would have to be supplied during the period of pumping from the reservoirs in the dry season. On the method of the projectors, the total reservoir capacity provided to supply this quantity would only be 20,000 million gallons; whereas we are satisfied that not less than 28,000 millions would be necessary.

The chief object of the reservoirs is to act as settling-tanks in which the suspended impurities contained in the water—largely derived from the river, as will be shown later on, in a turbid state—will be deposited, and not conveyed to the filters. It is clearly necessary, therefore, that a space towards the bottom of each reservoir should be reserved for the collection of solid matter, and for the preservation undisturbed of the lower water, which always contains an abnormal proportion of suspended matter derived from the water above, and which, when such reservoirs are low, contains also an abnormal proportion of life. For this purpose we have provided one-eighth of the total depth, though we have considerable doubt whether this would prove to be sufficient. Even in ordinary impounding reservoirs it is well known that the quality of water drawn from below is inferior to that drawn from near the surface; and that the impurity increases as the surface is lowered. In depositing reservoirs, the necessity for avoiding water near the bottom is imperative. In order, moreover, that periodical cleansing and repairs may take place, reserve reservoirs will be required.

These considerations involve increase in the constructional capacity as compared with the available capacity of the storage reservoirs. We find that to ensure the supplies during the summer of 1893 corresponding with 200, 300, and 400 million gallons a day respectively on the average of the whole year, and adopting approximately the same size for each reservoir as in the scheme laid before the Royal Commission, the numbers of reservoirs and capacities shown by roman type in the following table would be required. For the sake of comparison, the numbers and capacities given in the project as laid before the Royal Commission, with the increases we consider necessary, have been shown in italics.

Average Daily Supply to London during the Year.	Number of Consecutive Days during which any Water would be supplied from the Reservoirs.	Average Daily Supply to London from River and Reservoirs during the Periods in Column 2.	Reservoirs in Use.				Reservoirs in Reserve for Cleaning, Etc.		Total Constructional Capacity of Reservoirs.
			Available Contents required for Storage of Water for Filtration and Supply to London during Dry Period and Floods.	Constructional Capacity allowing for Evaporation and Bottom Impurity.	Number.	Constructional Capacity of Each.	Number	Constructional Capacity of Each.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
174·5	*97*	*184·0*	*5,116*	*6,000*	*3*	*2000*	*Nil*	*Nil*	*6,000*
200·0	114	211·2	6,282	8,000	4	2000	1	2000	10,000
222·1	*119*	*235·0*	*8,609*	*10,000*	*5*	*2000*	*Nil*	*Nil*	*10,000*
288·7	*165*	*300·0*	*17,526*	*18,000*	*9*	*2000*	*Nil*	*Nil*	*18,000*
300·0	167	311·8	19,726	24,000	12	2000	2	2000	28,000
400·0	217	412·1	37,740	46,000	23	2000	3	2000	52,000

Note.—The figures in columns 1, 3, 4, 5, 7, 9, and 10 represent millions of gallons.

It is to be observed that, for some reason at present unexplained, the excess of the summer supply over the average for the year was unusually small in 1893; and that in most dry years column 3 would therefore show a larger excess over column 1 than in the above table.

We find further that the storage so determined as necessary during dry weather would have been sufficient throughout the last 14 years to provide the required supply from stock during the first 15 days of any flood or floods discharging on each of those days more than 2300 million gallons at Teddington. Subject, therefore, to the doubt we have already expressed as to the sufficiency of our allowance of one-eighth of the depth of the

Particulars.	Supply of 200 Million Gallons a Day.		Supply of 300 Million Gallons a Day.		Supply of 400 Million Gallons a Day.	
	Remarks.	Capital Cost.	Remarks.	Capital Cost.	Remarks.	Capital Cost.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Land, easements, storage reservoirs, aqueducts, and incidental expenses at projectors' price—viz., £228·06 per million gallons stored—*plus* 10 per cent. contingencies .	Constructional Storage Capacity. Gallons. 10,000,000,000	£2,508,660	Constructional Storage Capacity. Gallons. 28,000,000,000	£7,024,248	Constructional Storage Capacity. Gallons. 52,000,000,000	£13,045,032
(2) Pumping-engines and buildings to pump water from river to reservoirs, at £45 per horse power, *plus* 10 per cent. for contingencies, calculated on the rate of pumping being as 15 days' duration of flood is to 20 days' duration of pumping, or three-fourths of the rate of supply lifted 30 feet, with the addition of reserve pumping power of 25, 17, and 13 per cent.	Horse Power, including Reserve 1,184	58,603	Horse Power, including Reserve. 1,661	82,220	Horse Power, including Reserve 2,137	105,782
(3) Pumping-engines and buildings to deliver water from filters into districts at £45 per horse power, *plus* 10 per cent. for contingencies. (Apparently a reserve of pumping power of 42 per cent. has been allowed in excess of the average power required) .	17,959	888,970	26,940	1,333,530	35,918	1,777,941
		£3,456,238		£8,439,998		£14,928,755
	The above sums include 10 per cent. for contingencies, but nothing for filters and connection with existing pipes, which items collectively would probably not differ in cost materially from the corresponding items in the Welsh project.					
	Annual Pumping Charges.					
(4) Pumping from the river to the reservoirs, at 5s. per million gallons	..	£4,570	..	£9,431	..	£15,435
Pumping to the town districts, at 50s. per million gallons	..	182,500	..	273,750	..	365,000
		£187,070		£283,181		£380,435

reservoirs for unavailable bottom water, the roman type figures in the last column of the above table may be taken as the constructional capacity of the reservoirs necessary to fulfil the conditions laid down by the projectors of the scheme presented to the Royal Commission. It will thus be seen that the scheme as laid before the Royal Commission would fail—by reason of insufficient reservoir capacity—to ensure the yield of clarified water to the extent and at the time apparently assumed by the projectors. Concerning this there can hardly be any doubt, though there may be differences of opinion as to the extent of the deficiency.

There is another point connected with the construction of these reservoirs to which attention should be drawn. It has already been stated that the projectors in their scheme as laid before the Royal Commission gave to the reservoirs a depth of 40 feet, the lower 10 feet of which would be filled from the river without pumping. No provision seems to have been made for pumping back to the river the unsuitable water in the bottom of the reservoirs. The promoters of the Staines, &c., Reservoirs Bill, 1896, on their deposited plans show reservoirs to hold 2500 million gallons, with a depth of 30 feet instead of 40 feet; the bottom level being above the level of the Thames. In this case the average cost of pumping from the river must, of course, be greater than it would be if one-fourth of the depth were below the level of the river; and the area occupied by reservoirs of a given capacity must be about one-third greater.

The greater area of reservoirs required at a depth of 40 feet would involve the acquisition for the 300 million gallons scheme of about 40 per cent. more land than was contemplated by the projectors of the scheme laid before the Royal Commission; and if the reservoirs were reduced to 30 feet in depth, the additional land required for both changes would be about 86 per cent. In respect of land, therefore, as well as reservoir capacity, we are of opinion that the provision made in the scheme laid before the Royal Commission is inadequate.

Apart altogether from the merits or demerits of the Staines project for the supply of any specific quantity of water, it is important to observe the very high ratio in which the necessary storage increases with the supply. Thus, for an increase of daily supply from 200 to 300 million gallons—an increase of only 50 per cent.—the increase in the storage must exceed 180 per cent.; and for an increase of daily supply of from 200 to 400 million gallons—an increase of only 100 per cent.—the increase in the storage must be 420 per cent.

Assuming that the rates in the projectors' estimates of expense are sufficient, but adding 10 per cent. for contingencies, as we have done in the case of the Welsh project, the cost of the works and the annual charges for pumping would be as shown in the statement given at the foot of p. 987.

In the figures in the table there is no charge for pumping foul water back to the river from portions of the reservoirs below the river level, nor any for the periodical digging out and cleansing always necessary. We have accepted the rates for pumping brought before the Royal Commission, although those for pumping to the town districts are below the present actual cost as set forth in the official returns. In any comparison of the Staines project with the Welsh project, so much of the annual pumping charges as would be avoided by the latter must obviously be capitalized on a proper basis.

The Engineers next consider (1) how far the proposed expenditure would make the scheme efficient as regards the condition of the supply at those times when the water would be sent to the filters direct from the Thames; and (2) the influence of the project upon the flow of the Thames.

Under the first head, they state their conviction that the scheme as laid before the Royal Commission was based upon a misconception of the condition of the Thames water when the volume at Teddington is less than 2300 million gallons a day, as compared with its condition when the flow is more than 2300 million gallons daily. The limit of 2300 million gallons is, they believe, entirely arbitrary; but it represents approximately, for a large portion of the river above Reading, the top bank-level, or the level at which the low-lying lands about the Thames begin to be flooded. Above this level, the discharging power of the river in relation to its sectional area increases more slowly, and the mean velocity may even decrease. They remark that the process of deposition of impurities, known as "sedimentation," occurs simultaneously with the scour; and the excess of one over the other is determined by the actual velocity and by the rate of change of velocity. They say they may reasonably expect, therefore, to find that the impurities in the raw river waters are often as great when the discharge is below as when it is above 2300 million gallons a day; and, further, that very bad conditions occur during small freshets following upon comparatively steady flows, even though such freshets amount to only a small fraction of 2300 million gallons a day.

They then proceed to ascertain how far these views are borne out by actual observation; their remarks on this point being as follows: So far as we are aware, the only independent observations of the raw Thames water, as distinguished from the water after filtration, of sufficient frequency to answer the purpose, are those made by Dr. [now Sir Edward] Frankland for the Local Government Board, and reported each month by the Water Examiner appointed under the Metropolis Water Act, 1871. Since May, 1892, Dr. Frankland has examined every month a sample of water collected from the Thames at Hampton, and has reported the number of microbes per cubic centimetre contained in such water. Whatever differences of opinion there may be as to the specific effect of the Thames microbes, it will be generally conceded that their numbers at different times form a good criterion of the relative condition of the water at those times, and of its suitability or otherwise for filtration without previous storage. A critical examination of these returns appears to us to support in a very significant manner the conclusions to which *a priori* reasoning on hydraulic principles would lead. It leaves no doubt that if the storage of Thames water is needed, in any condition of the river, before filtration, that storage should be applied when the river is discharging very much less than 2300 million gallons a day at Teddington, and it shows further that no conclusions as to the necessity for storage at any particular time based merely upon the discharge at Teddington at that time are trustworthy.

The Engineers examine in detail the observations referred to—55 in number—made between May, 1892, and October, 1896, and say: It appears that out of the whole number of observations, only five represent water which would be avoided by the scheme. In these cases the water contained on an average 32,077 microbes per cubic centimetre; while in another set of five the water would have passed to the filters direct, though it contained an average of 32,982 microbes per cubic centimetre. Under these circumstances we are of opinion that Dr. Frankland's independent observations justify the view at which we have arrived on hydraulic considerations, that the impurities in the raw river water are often as great when the discharge is below as when it is above 2300 millions a day; and they undoubtedly indicate that if, for example, the project as laid before the Royal Commission had been in operation during the last five years, foul river water would have been supplied to the filters direct in about the same number of cases in which equally foul river water would have been avoided.

It has been very generally supposed that by the report of the Royal Commission the project for the construction and working of storage reservoirs as laid down by the projectors, and which we have thus criticized, was found to be sufficient; but the Commissioners have carefully guarded themselves against the consequences of any such misconception. Paragraph 134 of their report is as follows: "These being the facts, we are of opinion that by the construction in the neighbourhood of Staines of reservoirs of adequate capacity into which water shall be pumped and stored in times of excess to be used in times of deficiency, at least 300 million gallons a day may be obtained for the supply of London. We believe this can be done without taking in the more turbid of the flood waters and without injuriously diminishing the volume of the river below the point of abstraction. To ensure the best results in both these respects, the taking of the water should be subject to strict regulations laid down by Parliament." With the conclusions thus expressed we agree, except as to the words "without injuriously diminishing the volume of the river below the point of abstraction;" but, as we have shown, a satisfactory condition of the water cannot be secured by the scheme as projected, if the water to be avoided is limited to the first 15 days of a flood exceeding 2300 million gallons a day. That regulations for the taking of water could be laid down by Parliament, which if strictly observed would secure the use of Thames water in its better conditions only, is quite true; but such regulations would involve the construction of much larger and more costly reservoirs than those we have referred to as necessary to fulfil the conditions laid down by the projectors of the scheme, but to which conditions the Royal Commissioners did not commit themselves.

(*To be continued.*)

ARBITRATION UNDER THE STAINES RESERVOIRS ACT.

(*Before Sir* G. B. Bruce, M.Inst.C.E.)

At the Royal Courts of Justice last Wednesday, Sir G. B. Bruce sat as Arbitrator in regard to a claim for compensation of an exceptional character under the Staines Reservoirs Joint Committee Act of 1896.

Mr. Cripps, Q.C., M.P., and Mr. Harper appeared for the claimants and Sir Edward Clarke, Q.C., M.P., for the Joint Committee.

Mr. Cripps, in opening the case, said that the Ramie Syndicate was formed in 1895, for the purpose of carrying on a special textile manufacture; and they bought the Hythe End Mills and 12½ acres of ground, situate above Staines on the Colne Brook, and spent about £10,000 in machinery. In the same year, the Syndicate received notice of the application of the Joint Committee to go to Parliament for powers to abstract 100 million gallons a day from the Colne Brook. The Syndicate had a Hercules turbine of 50-horse power and a wheel of 10-horse power; and they had additional water power sufficient to work another turbine of from 30 to 40 horse power. A small portion of their property had been taken for laying down a conduit communication between the head-water of their mills and the new reservoir being constructed at Staines, which would take away the whole of their water power. The average flow of water was between 70 and 80 million gallons per day. The question was what was the value of this water power of which his clients had been deprived.

Mr. *Urban Smith*, who was the first witness, said he had gauged the River Colne for seven months, from May to November, and the average flow was 72½ million gallons per day. If the water supply was taken away, they would have to substitute steam power equal to 82-horse power; and he estimated the total damage to the Syndicate at £26,282—that was to say, it would cost this amount to reproduce the power they could get from the Colne.

Mr. *E. K. Burstal* estimated the compensation to place the Syndicate in the same position as they would have been with the use of the whole of the water of the Colne at £29,653.

Mr. *T. Fenwick* put his valuation at £33,000, and added 10 per cent. for compulsorily taking away the water.

Mr. Cripps observed that he did not claim this 10 per cent. in addition.

Sir E. Clarke: He is claiming compensation as though we were taking the whole 12½ acres, instead of a single pole as an easement.

Mr. *H. Rofe's* estimate of the damage was £29,238.

Sir E. Clarke said that this was the most remarkable claim he had ever heard. The owners of the property bought 12½ acres of land for £4250 in 1895; and in a short time notice to treat was given. Then they made a claim for £25,000; and Mr. Fenwick had asked for no less than £36,000. They had bought the land partly for the area on which they could carry on their works, and partly because they had water power to help them; and now they asked £36,000 as compensation for the water power. He admitted that the water power might be taken away; but there was an ingenious attempt to get more than a trade claim under the guise of making no trade claim at all. If this were a trade claim, and a question of re-instatement, no one would contend that £36,000 would be required to be spent to put the Syndicate into a position of as great advantage somewhere else. The whole case was a hypothetical one. To take away the water rights from this piece of land could not involve the payment of a sum nine times as great as the value of the whole land and water rights. The real question was: How much was this 12½ acres worth before the Joint Committee came, and how much less after they came? The market value in 1895 was £4250; and what the Committee would have to pay would be the difference between the market value with and without the water—or about £2000.

Sir *J. Whittaker Ellis* thought the mill was not fit for manufacturing

purposes; it had no water or railway carriage. Its present value was £4000. The gross rating was £186; and rating was generally a fair guide to value.

Mr. *E. H. Bousfield* said he considered the fair rental £200 a year, and the capital value £4000. The premises were practically for experimental purposes, and were wholly unsuitable for carrying on a business at a profit.

Mr. *T. Horn* corroborated the last witness.

Sir E. Clarke and Mr. Cripps having spoken for their clients,

Sir G. B. Bruce intimated that he would visit the locality before making his award.

LIVERPOOL CORPORATION WATER SUPPLY.

The Rivington Reservoirs Threatened with Contamination.

The Manchester and Chorlton Joint Asylums Committee have applied to the Local Government Board for permission to purchase land and premises known as the Anderton Hall and Park Estate for the purpose of providing an asylum for imbeciles and epileptics; but the scheme is strongly opposed by the Liverpool Corporation, mainly on the ground that it would tend to contaminate the water in their Rivington reservoirs. On behalf of the Board, Major-General Crozier and Dr. Theodore Thompson sat last week at the Manchester Town Hall to hear the evidence of both parties. Mr. Cripps, Q.C., on behalf of the Liverpool Corporation, said they had spent about £1,250,000 on these reservoirs, and they supplied a population of from 900,000 to 1,000,000. Their water arrangements ought not, therefore, to be lightly interfered with, and, above all, one authority ought not to take over a property of this kind against the will of another. It was said that this was the only possible site for such an institution; but this, he thought, was not a good contention. It could not stand when it was placed side by side with the fact that the scheme would bring risk of contamination to about a million people. Resolutions from a number of Local Authorities who opposed the scheme having been put in, the Town Clerk of Liverpool (Mr. Harcourt E. Clare) and the Water Engineer (Mr. J. Parry) gave evidence; the latter saying it would be extremely difficult, under any circumstances, with very extensive and costly works, to intercept the whole of the sewage by means of a canal or sewer, or both. There were always risks of leakage in drainage and sewerage works; but there were peculiar difficulties with regard to this site, owing to the fissures that existed and the trouble attending the allocation of them. Sir H. Littlejohn, Medical Officer of Health for Edinburgh, and adviser to the Scottish Local Government Board, said he had frequently had to deal with water supplies, and he had never known an institution of the character of the one in question being placed by the side of a water supply for domestic purposes. He had inspected the site of the proposed asylum, and he held that to erect it there would be improper and dangerous. Dr. T. Stevenson and other medical witnesses expressed strong opinions against the site; while Mr. G. F. Deacon, formerly Water Engineer to the Corporation, said the asylum could not be placed in a worse position, so far as the reservoirs were concerned. If it were erected, the water supply would have to be shut off at this particular point. He believed there was most serious risk in the scheme of the Joint Committee. Mr. Balfour Browne, Q.C., for the Committee, argued that the carrying out of the proposals of the Joint Committee would be a decided improvement upon present conditions. Complete precautions which did not at present exist would be taken to prevent contamination. He protested against the idea that the Corporation were to be set above the Local Government Board. The inquiry then closed.

Reduction in Price at Slough.—The Slough Gas Company have announced a reduction of 3d. per 1000 cubic feet—from 4s. 6d. to 4s. 3d. —in the price of gas.

Appeals under the Workmen's Compensation Act.—In the Court of Appeal last Thursday, Lord Justice A. L. Smith announced that, as no rules had been made applicable to the procedure on appeals from County Courts to the Court of Appeal under the above-named Act, the Court desired it to be known that, until further order, every appeal under the Workmen's Compensation Act, 1897, is to be by notice of motion, and must be entered at the Crown Office department of the central office by lodging a copy of the notice. The notice of motion is to state the grounds of the appeal, and be an eight-day notice. It is to be served on every party directly affected by the appeal entered.

Sales of Stocks and Shares.—At Durham, on Monday last week, Mr. W. T. Bowden sold some fully-paid £10 "B" shares in the West Hartlepool Gas and Water Company at £20 apiece; some fully-paid £5 "B" shares being purchased at prices ranging from £10 11s. to £10 15s. each. At Lewes, on Tuesday, Messrs. Herbert Morris and Sons submitted to public auction £1500 new ordinary stock in the Lewes Gas Company; being the second portion of capital authorized to be raised in pursuance of the powers conferred by the Company's Act of 1878. The stock was divided into thirty £50 lots; and these were briskly disposed of at prices varying from £71 to £74. On the same evening, a sale by auction was held at the Borough Mart, Chatham, by Mr. W. E. R. Randall, who put up 1000 ordinary shares of £5 each in the Brompton, &c., Water Company. They will bear a maximum dividend of 7 per cent. per annum, and form a portion of the capital authorized by the Company's Act of the present year. The whole of the shares were sold at prices ranging from £10 2s. to £10 12s. each. The bidding was brisk. Messrs. G. Nichols, Smith, and Alder offered for sale last Thursday, £20,000 worth of 5 per cent. stock and £5000 worth of new debenture stock, bearing interest at the rate of 4 per cent., in the Bristol Gas Company. The bidding began at 124, and increased by fractions to 125¼, at which price the largest proportion was sold to the Chairman of the Company (Mr. J. W. S. Dix); five shares realized 125⅜; and about 20 went for 125. The total amount realized was £25,038, or an average of £125 3s. 9½d. per cent. The sale of a portion of the debenture stock at £131 per £100 of stock produced £3144; and the remainder was withdrawn.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 967.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21½–22½	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	16–17	..	4 8 3
300,000	100	July 1	5	Australian 5 p. c. Db. .	105–107	..	4 13 6
300,000	5	May 26	6	Bombay, Ltd. . . .	6¾–7	..	4 5 9
40,000	5	,,	6	Do. New, £4 paid .	4¾–5	..	4 16 0
880,000	Stk.	Aug. 12	12	Brentford Consolidated	275–280	..	4 5 9
240,000	,,	,,	9	Do. New . . .	210–215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Prf.. .	140–145	..	3 9 0
159,375	,,	June 10	4	Do. 4 p. c. Db. Stk.	130–135	..	2 19 3
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig..	263–268	..	4 5 10
226,320	,,	,,	8½	Do. A. Ord. Stk. .	190–195	..	4 7 2
933,500	Stk.	Aug. 31	5	Bristol, 5 p. c. max.. .	125–130	..	3 16 11
420,000	20	Sept. 29	10	British	50–51	−½	3 18 5
50,000	10	Aug. 12	11½	Bromley, Ord. 10 p. c. .	25–27	..	4 5 2
75,000	10	,,	8½	Do. 7 p. c. .	20–22	..	3 17 3
600,000	10	Oct. 13	6	Buenos Ayres (New) Ltd	9½–9¾	+¼	6 3 1
98,122	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	98–100	..	4 0 0
150,000	20	July 14	8½	Cagliari, Ltd. . . .	29–30	..	5 10 0
100,000	10	Sept. 29	7	Cape Town & Dis., Ltd.	14–15	−1	4 13 4
50,000	50	May 3	6	Do. 6 p. c. 1st Mort.	58–60	..	5 0 0
550,000	Stk.	Oct 13	13½	Commercial Old Stock .	310–320	..	4 4 5
200,750	,,	,,	10½	Do. New do. . .	247–252	..	4 3 4
200,750	,,	June 10	4½	Do. 4½ p. c. Db. dc.	148–153	..	2 18 10
800,000	Stk.	June 10	12	Continental Union, Ltd.	207–212	..	5 13 2
200,000	,,	,,	9	Do. 7 p. c. Prf. .	193–198	..	4 10 11
51,600	Stk	Aug. 31	14	Croydon A 10 p. c. . .	305–310	..	4 10 4
168,400	,,	,,	11	Do. B 7 p. c. . .	255–265	..	4 3 0
555,000	Stk.	Aug. 12	5½	Crystal Palace Ord. 5 p. c.	125–130	..	4 0 9
60,000	,,	,,	5	Do. 5 p. c. Prf. .	140–145	..	3 9 0
486,090	10	July 28	11	European, Ltd. . . .	23–24	..	4 11 8
354,060	10	,,	11	Do. £7 10s. paid .	17–18	..	4 11 9
5,922,230	Stk.	Aug. 12	12½	Gaslight & Coke, A, Ord	288–293	..	4 3 6
100,000	,,	,,	4	Do. B, 4 p. c. max. .	120–125	..	3 4 0
665,000	,,	,,	10	Do. C, D, E, 10 p. c. Prf.	308–313	..	3 3 11
80,000	,,	,,	5	Do. F, 5 p. c. Prf. .	152–157	..	3 3 8
60,000	,,	,,	7½	Do. G, 7½ p. c. do. .	230–240	..	3 2 6
1,300,000	,,	,,	7	Do. H, 7 p. c. max. .	195–200	..	3 10 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf. .	308–313	..	3 3 11
476,000	,,	,,	6	Do. K, 6 p. c. Prf. .	185–190	..	3 3 2
1,061,150	,,	June 10	4	Do. 4 p. c. Db. Stk. .	131–133	..	3 0 2
294,850	,,	,,	4½	Do. 4½ p. c. do. .	148–153	..	2 18 10
958,000	,,	,,	6	Do. 6 p. c. do. .	198–203	..	2 19 1
70,000	10	May 12	8	Hongkong & China, Ltd.	14–15	..	5 6 8
3,800,000	Stk.	,,	10	Imperial Continental .	223–228	..	4 7 9
376,400	100	Aug. 2	4	Do. 4 p. c. Dbs. Red.	98–101	..	3 19 8
473,600	Stk.	Aug. 12	3½	Do. 3½ p. c. Db. Stk. ,,	101–104	..	3 7 4
660,000	100	Oct. 1	5	Met. of Melbourne	5 p. c. Db. 4½ p.c.Db.	110–112 105–107	.. ..	4 9 3 4 4 1
250,000	100	,,	4½				
75,000	5	June 29	6	Malta & Medn., Ltd. .	4⅞–5⅛	..	5 14 3
641,920	20	June 10	5	Monte Video, Ltd. . .	13¾–14½	..	6 18 0
617,946	Stk.	Aug. 31	9¾	Newc'tle & Gatesh'd Con.	230–240	..	4 1 3
252,355	Stk.	Jan. 8	3½	Do. 3½ p. c. Db. Stk.	113–117	..	2 19 10
150,000	5	May 26	8	Oriental, Ltd. . . .	7¼–7⅝	−¼	5 3 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6¾–7	..	5 2 11
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼–1⅜	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd. . . .	5–5½	..	6 6 2
500,000	100	June 1	6	People's Gas of Chicago 2nd M. Bd.	103–108	..	5 11 1
848,070	10	Oct. 13	6	River Plate Ord.. . .	9–9½	..	6 6 4
250,000	Stk.	June 29	4	Do. 4 p. c. Db. Stk.	99–101	..	3 19 3
250,000	10	Sept. 29	10	San Paulo, Ltd. . . .	14½–15½	..	6 9 0
135,000	Stk.	Sept. 15	10	Sheffield A.	243–245	..	4 1 8
209,053	,,	,,	10	Do. B.	242–245	..	4 1 8
447,427	,,	,,	10	Do. C.	242–245	..	4 1 8
5,600,000	Stk.	Aug. 12	5½	South Metrop., 4 p.c. Ord.	138–142	−½	3 15 1
1,460,000	,,	July 14	3	Do. 3 p. c. Db. Stk. .	102–105	..	2 17 2
60,000	Stk.	Aug. 31	12	Tottenham and Edmonton B. .	280–290	..	4 2 9
60,000	,,	,,	9	Edmonton B. .	200–210	..	4 5 9
182,380	10	June 10	7	Tuscan, Ltd.	10¼–11½	..	6 1 9
149,900	10	July 1	5	Do. 5 p. c. Dbs. Red. .	100–103	..	4 17 1
				WATER COMPANIES.			
746,164	Stk.	June 29	10½	Chelsea, Ord.	313–318	..	3 6 0
150,000	,,	,,	5	Do. 5 p. c. Prf. . . .	170–175	..	2 17 2
160,000	,,	,,	4½	Do. 4½ p.c. Pf. Stk., 1875	148–152	..	2 19 3
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Db. Stk. .	155–160	..	2 16 3
1,720,560	Stk.	Oct. 18	7	East London, Ord. . .	212–217	..	3 4 6
654,740	,,	June 29	4½	Do. 4½ p. c. Db. Stk.	157–160	..	2 16 3
890,000	,,	,,	3	Do. 3 p. c. Db. Stk..	103–105	..	2 17 2
700,000	50	June 29	7½	G'd Junct'n, 10 p. c. max.	115–118	..	3 3 7
310,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	140–145	..	2 15 2
708,000	Stk.	Aug. 12	14	Kent	365–370	..	3 15 8
160,000	,,	,,	7	Do. New, 7 p. c. max..	212–217	..	3 4 6
1,043,800	100	June 29	10½*	Lambeth, 10 p. c. max. .	300–305	..	3 8 10
406,200	100	,,	7½	Do. 7½ p. c. max..	228–233	+1	3 4 4
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Db. Stk.	140–145	..	2 15 2
500,000	100	Aug. 12	13½	New River, New Shares	435–440	..	3 0 2
1,000,000	Stk.	July 28	4	Do. 4 p. c. Db. Stk.	140–145	..	2 15 2
902,300	Stk.	June 29	6	Southw'k & V'xhall, Ord.	166–171	..	3 10 2
126,500	100	,,	6	Do. do. 7½ p. c. max. .	160–165	..	3 12 9
489,200	Stk.	,,	5	Do. do. 5 p. c. Prf. .	170–173	..	2 17 10
1,019,585	,,	Oct. 13	4	Do. 4 p. c. A Db. Stk.	139–142	..	2 16 4
1,155,066	Stk.	June 10	10	West Middlesex . . .	300–305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Db. Stk.	162–165	..	2 14 7
200,000	,,	Sept. 15	3	Do. 3 p. c. Db. Stk.	102–105	..	2 17 2

* Next dividend will be at this rate.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Gas Committee of the Glasgow Corporation had before them on Tuesday the report by Mr. W. Foulis, upon the position of the gas supply, in view of the proposal to erect new works at Blochairn. In his report, Mr. Foulis pointed out that, whereas in 1874 the maximum consumption of gas in 24 hours was 9,162,000 cubic feet, in the present year it has risen to 31,354,000 cubic feet; and that it is imperative that new works for the manufacture of gas be provided in two years' time. A Sub-Committee had visited the ground, and recommended that the Blochairn site be agreed to, and that application should be made to Parliament for the necessary powers. The General Committee, at their meeting on Tuesday, were considerably divided over the matter; and their recommendation is that the site be approved of, subject to the inclusion in it of the estate of Blackhills, which already belongs to the Corporation. I suppose the desire to include Blackhills in the site is two-fold—the estate is a sort of "white elephant" in the hands of the Corporation; and it gives an opportunity for pushing the gas-works a little further away from the residential district of Dennistoun. The Blochairn ground extends to 98 acres, and Blackhills to 70 acres. The total expenditure upon the new site and works is estimated to approach a million sterling. The Gas Committee and the Parks Committee, who are interested in the matter in respect of the proximity of the Alexandra Park to the new works, held a conference on the subject on Thursday, as the outcome of which the Parks Committee, by a large majority, agreed not to offer any opposition to the proposals of the Gas Committee. The Corporation are to hold a special meeting on Monday to discuss the scheme.

At a meeting of the Sub-Committee on Finance of the Glasgow Gas Trust held last Wednesday, it was announced by the Treasurer (Mr. J. Fleming) that the revenue derived from the sale of residual products at all the works belonging to the Trust in the four months ending the 30th of September amounted to £33,763, as compared with £27,396 for the corresponding period of 1897. These figures give an increase for the present year amounting to £6367.

The Edinburgh and Leith Gas Commissioners held a meeting on Thursday for the transaction of ordinary business. The report of Mr. Herring, the Engineer, showed that since May 16 there had been an increase in the output of gas over the corresponding period of last year of more than 5 million cubic feet. The number of gas-cookers fixed since May 16 has been 381 in Edinburgh, 294 in Leith, and 56 in Portobello. Bailie Kinloch Anderson reported that the new incandescent gas lights were installed on one side of Melville Street, the old lights having been left on the opposite side to show the contrast. There were also installations in Meadow Walk and Drummond Street. He hoped the public would go and look at the lamps, and they would see the great improvement there was in the light. The Commissioners, agreeing to a recommendation of the Works Committee, let the contract for the construction of a gasholder tank upon the site of the new works at Granton, at the price of £17,804 12s., of which £2000 is for contingencies, to Mr. Colin Macandrew, of Edinburgh, whose offer was the lowest. It was reported that Mr. Reginald Macleod, C.B., the Queen's Remembrancer, had agreed to remain tenant of Granton House, now belonging to the Commissioners, on the former conditions; also that Mr. Macdonald, the tenant of the lands at Granton, had agreed to remain in the occupation of such lands as the Commissioners did not require at Granton, and also to take a lease of the grass parks at Granton House. Mr. Herring stated that the reports of the deputations to England and the Continent were being prepared, and would be sent out to the Commissioners as soon as they were ready. The minutes of the Finance Committee showed that the Treasurer (Mr. John S. Gibb) this month redeemed £42 of the Edinburgh-Portobello gas annuities at £25; and also £28 of the Edinburgh and Leith gas annuities at £29⅞ each.

The tank which is about to be constructed at Granton will be the second from the east-end of a row of holders which it is proposed to erect upon the northern boundary of the new site. It will be of 252 ft. 6 in. diameter inside, and 37 feet deep, from the bottom to the coping. The wall will be of brick and puddle, with a stone coping. It is expected that abundance of stone excellently suited for the work will be found in the material to be excavated. It has been resolved not to sink the tank wholly into the ground, but to partially bank it up. The ground slopes slightly, and thus the tank will stand above the surface, at one side to the extent of 12½ feet, and on the other side of 4 feet. Specifications for the holder are being prepared.

It is advertised that the Stirling Gas Company have intimated to the Sheriff of the County their desire to have their works valued by the Assessor of canals and railways. This is a right which gas-works are favoured with; the reason being that their undertakings frequently extend into more than one jurisdiction. Of course, at Stirling there would be no difficulty in arriving at the true valuation of the undertaking of the Gas Company, if an earnest attempt to do so were made; but it is likely that the Company do not wish to remain at the mercy of a Corporation who have shown them so little good-will of late.

I am gratified to observe that, in Forfar, Mr. Craik, who was for years Convener of the Gas Committee, has put to the electors of the burgh the question whether it is fair to continue to pound away at the Gas Manager. He is sick and tired of it, and thinks that the Manager should have some peace. Bailie Pattullo, at the same meeting, remarked that the speeches of Mr. Christie at the Corporation were simply and purely attacks on the Manager. Treasurer Fenton said much ingenuity had been shown to put the Gas Manager in the wrong; but the report of the Auditors, which had been received, was a commendation of him. It is high time the Gas Corporation of Forfar were adopting saner methods of conducting their business. The Corporation have been too long swayed by personal feeling.

An explosion of gas occurred in Glasgow on Wednesday, which is worthy of note in respect that it was not caused, as is usually the case, by a light being employed to search for an escape. A vanman, who says there was no light near, opened the door of a store adjoining a stable behind the Sailors' Home; and at once he was hurled against his van and severely shaken. About 12 feet of the street paving was torn up;

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some of the stones being thrown a distance of 6 feet. It is this throwing up of the street which gives the matter an alarming appearance. A leak was found in the service-pipe supplying the Home, which accounts for the presence of the gas; but what fired it is a mystery.

Viewforth Free Church, in Edinburgh, was almost entirely destroyed by fire this morning. This place of worship was recently modernized, and fitted with electric light, and with an electric motor for driving the organ bellows. The fire broke out in the neighbourhood of the motor; and as it was being used last night, in the weekly practice of the choir, it is conjectured that something must have gone wrong with the electric current. This is highly probable; otherwise the suggestion would not have been made, because, as I have pointed out before, since the introduction of electricity, newspaper reports have become ominously silent as to the causes of the fires recorded. There can be no doubt that fires are occurring which have their origin in a derangement of the electric current; yet it seems beyond the power of the newspapers to get information to this effect.

The Recent Visit of the Deputation of the Edinburgh and Leith Gas Commissioners to the Continent.—At a meeting of the Edinburgh and Leith Gas Commissioners held on the 3rd ult., on the return of the deputation appointed to visit a number of gas-works abroad, Bailie Kinloch Anderson, the Convener, said his first word in regard to their visit to the Continent was that "he thought he had opened up or possibly might open up, a *market for coke* there, which would be of great benefit to them." The statement has evoked the following effusion from a well-known correspondent:—

Oh! Bailie K. A.,
You've been far away,
On a tour of inspection bent.
You've looked well around,
A *coke market* you've found
To help your new works pay the rent.

Dear Bailie K. A.,
Is this gratitude, pray,
For the good time you spent on our shore?
A time may soon come,
When *our coke* will be run
To Granton, and then *we* shall score!

Sweet Bailie K. A.,
I should like much to say,
Your morals I greatly deplore.
To ruin our trade
You've a little plan laid,
Your name should be Mac Callum More!

Copenhagen, Oct. 27, 1898. SKAAL.

A Novel Stokers' Grievance.—The stokers at the Driffield Gas-Works are reported to have a grievance of an unusual kind—viz., that a fellow-workman lags behind in his daily task. The Committee are giving the complaint their best consideration.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 29.

Sulphate of Ammonia.—During the early part of the week, the market was very quiet; but, within the past few days, there has been more activity—the demand being mainly for immediate delivery. The closing quotations are £9 11s. 3d. to £9 12s. 6d. per ton f.o.b. Hull and Leith; and £9 15s. per ton f.o.b. Liverpool. Consumers show more disposition to buy, and they have done a fair share of the purchasing; but their requirements not being urgent, they hesitate about paying an advance. In the forward position, there has also been more interest; but not much actual business has been done, owing to the firmness of makers.

Nitrate of Soda is firm at 7s. 7½d. per cwt. for good, up to 7s. 9d. for refined quality, on spot.

LONDON, *Oct.* 29.

Tar Products.—There is some improvement in the value of benzol, but whether of a permanent or temporary character it is difficult to say. Business, however, has been done at a considerable advance on the bottom price. Pitch and creosote are also firm, and in good request, with every appearance of better prices being touched. There is a strong inquiry for naphthalene in every form, but prices show no tendency to improve. Carbolic acid is very much inquired for, both for prompt and forward delivery, and may reasonably be expected to advance. There is nothing further to report as to the position of anthracene.

Prices are as follows: Tar, 14s. to 19s. Pitch, east coast, 25s. 6d.; west coast, 22s. 6d. Benzol, 90's, 9d.; 50's, 9¼d. Toluol, 1s. 1½d. Solvent naphtha, 1s. 2d. Heavy naphtha, 1s. 0½d. Crude, 30 per cent., naphtha, 3¼d. Creosote, 2¾d. Heavy oil, 40s. to 50s., according to gravity. Carbolic acid, 60's, 1s. 11d. Naphthalene, 50s.; salts, 32s. 6d. Anthracene, nominal, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—The position of sulphate has somewhat improved during the past week; but only to the extent of one or two shillings a ton. The present price ranges from £9 8s. 9d. to £9 12s. 6d. per ton, less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The continued exceptional mildness of the season still tends to check any development of activity in the coal trade of this district, so far as the better qualities, suitable for house-fire purposes, are concerned. Pits are mostly working full time; but with only a moderate demand coming forward, difficulty is experienced in moving away the output. Except, however, in a few isolated cases—chiefly with surplus coal from outside districts, offering for prompt clearance sale at something under full current rates—prices generally are well maintained; and the leading Lancashire collieries are all firm at the full list quotations. Best Wigan Arley can scarcely be quoted under 11s. to 11s. 6d. per ton at the pit; Pemberton four-feet and seconds Arley, 9s. 6d. to

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Merrifield—Westcott—Pearson Patents.

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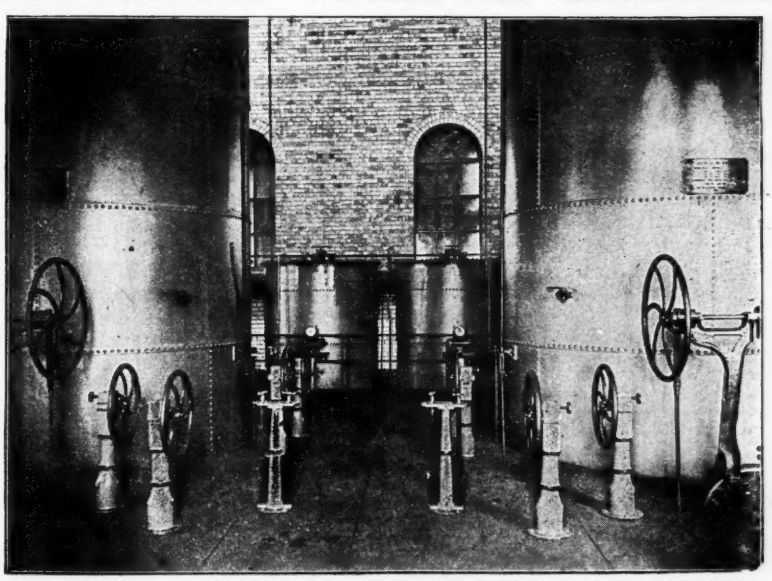


RESULTS PROVE EFFICIENCY.

Working Floor of Generator House. One Quarter Section of Birmingham Plant, Windsor Street Station.
The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

10s. 6d.; and common house coal, from 7s. 6d. to 8s. 6d. Other descriptions of round coal generally meet with a ready sale; from 7s. to 7s. 6d. per ton at the pit being obtained for good qualities of steam and forge coal. The position in the shipping trade is, however, at present anything but satisfactory. The demand has fallen off considerably of late; and not only is this the case, but collieries that have coal sold in some instances since September have been unable to secure vessels to execute their orders, while the increase in freights is also tending to further interfere with business. It is only for some of the special qualities of steam coal that more than 9s. to 9s. 3d. per ton is now being obtained for delivery at the ports on the Mersey. A decided briskening up in slack has been noticeable during the past week. Not only is there a good demand for engine requirements, but slack is going more largely into use for other manufacturing purposes where round coal has previously been employed; and with this increased consumption, and also large demands for coke making, practically withdrawing some descriptions of slack from the market, the position promises to be a very strong one, with possibly a scarcity of this class of fuel. Prices are exceedingly firm at the full rates which have been ruling recently—averaging 3s. 6d. to 3s. 9d. per ton at the pit for common; 4s. 3d. to 4s. 6d. for medium; and 4s. 9d. to 5s. 3d. for the best sorts. For forward contracts, representatives of collieries are for the most part quoting advances averaging about 6d. per ton over last year's rates, and 3d. per ton above general current quotations.

Northern Coal Trade.—There is a better demand for coal, and shipments have shown a considerable increase now that there is an abundant tonnage of steamers taking coal cargoes. Best Northumbrian steam coals are in fuller request, and the price is firmer at from 9s. 6d. to 9s. 9d. per ton f.o.b. Second-class steam coals average about 9s. per ton; and steam smalls are 5s. 9d. Gas coals are now being delivered in very large quantities on old contracts; and the prices for casual cargoes are steady at from 9s. 6d. to 11s. per ton f.o.b., according to quality. There are rumours of contracts being entered into for shipment next year, and the prices spoken of are from about 9s. 6d. per ton f.o.b.; but the exact rates are not yet obtainable. The price of gas coke is not generally altered this week.

Scotch Coal Trade.—The stormy weather has interfered with shipping so much that the market has shown a downward tendency, which, however, may soon pass away. Sales for forward delivery were expected to be strong, but as yet they do not seem to be plentiful. The prices quoted are: Main, 8s. per ton f.o.b. Glasgow; ell, 8s. 9d. to 9s.; and splint, 9s. to 9s. 3d. The shipments for the week amounted to 166,095 tons—a decrease upon the preceding week of 39,085 tons (nearly the whole of which was due to the disarrangement of shipping at the Forth and Fife ports), and of 16,637 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,019,278 tons—showing an increase upon the same period of last year of 1,447,138 tons.

Fylde Water-Works Transfer.—Last Thursday, the shareholders of the Fylde Water Company confirmed the agreement the Directors have entered into with the Joint Water Board for the sale of the undertaking. The terms were published in the "JOURNAL" for the 18th ult.

The Proposed Purchase of the Godalming Water-Works by the Local Authorities.—A statutory meeting of owners and ratepayers of Godalming was held last Thursday to consider the advisability of the promotion by the Town Council of a Bill to authorize them to purchase the Frith Hill, Godalming, and Farncombe Water Company's undertaking—a course recently sanctioned by the Council (see *ante*, p. 935). A formal resolution was put by the Mayor, who declared it lost. A poll was demanded.

Incandescent Gas Lighting at Lewes.—In moving the confirmation of the proceedings of the Highways and Works Committee at the meeting of the Lewes Town Council last Wednesday, Mr. Barrett called attention to the improved lighting of the borough. He said that out of a total of 234 street-lamps, no fewer than 100 contained ordinary incandescent burners, and 28 patent ones; and they produced a most brilliant light. He thought the thanks of the Council were due to the Gas Company for the enterprise they had shown, and the public spirit they had manifested, in endeavouring to improve the lighting of the borough. The Company had spent from £150 to £200 on the incandescent burners; and they charged nothing extra for the improved illumination—in fact a three-fold light was supplied at a little under the usual cost. He did not think the public would like to go back to the old yellow light that was formerly seen in the streets.

Austrian Incandescent Gas-Light Company, Limited.—The Directors of the Welsbach Incandescent Gas-Light Company, Limited, in forwarding to the shareholders the report and accounts of the original Austrian Incandescent Gas-Light Company of Vienna for the year ended June 30 last, remind them that the Welsbach Incandescent Gas-Light Company absorbed the First and Second Austrian Share Companies, and by the shares thus acquired, together with subsequent purchases, the new Company have become holders of 95 per cent. of the total capital of the Vienna Company. The Welsbach Company was incorporated on Dec. 10, 1897, and is therefore entitled to the profits of the Vienna Company since that date; the proportion of profits from July 1 to Dec. 9, 1897, having been dealt with under the Scheme of Amalgamation. They think the fact that a dividend of 100 per cent. should have been declared by an undertaking so largely in their own hands cannot fail to be gratifying to the shareholders of the Welsbach Company. The business report of the Directors of the Oesterreichische Gasglühlicht Actiengesellschaft for the year ended June 30 states that the profit on trading account amounts to 1,979,674 fls. This shows, as compared with the trading profit of the previous year, amounting to 1,538,439 fls., an increase of 441,235 fls. This increase is a consequence of the larger sale of all the products of the factories, which has to a great extent been the result of the reduction in prices carried out by the Directors. The cash in hand and deposits at bank amounted at the close of the past financial year to 1,115,651 fls. The total profit for 1897-8, including the balance of profit—viz., 81,585 fls.—brought forward from the previous year, amounts to 1,528,842 fls.; and the Directors propose to pay the shareholders a dividend of 5 per cent. on the share capital, and divide the remaining sum as an extra dividend of 95 per cent.—carrying forward the balance of 28,842 fls.

TWO HEROES.

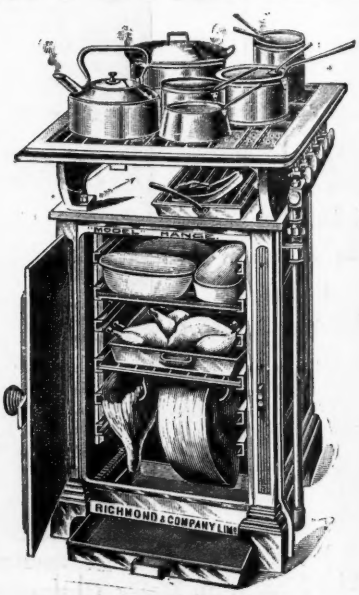
RICHMOND'S

GORDON.

LONDON,
WARRINGTON,
STRATFORD,
PLYMOUTH.

RICHMOND'S

KITCHENER.



The Assessment of the Dewsbury Gas-Works.—The Dewsbury Town Council have resolved to make formal objection against the assessment of their gas-works in the townships of Dewsbury, Soothill, and Thornhill, and to retain Counsel in the event of an appeal to Quarter Sessions.

Proposed Combination of Coalowners.—A correspondent of the "Standard" says that efforts are being made for the combination of leading colliery proprietors in Lancashire, with the object of maintaining remunerative prices on contracts entered into with steamship, railway, gas, and other large companies.

The First Workmen Directors of the South Metropolitan Gas Company.—The voting for the first Workmen Directors of the South Metropolitan Gas Company has resulted in the election of Messrs. Austin (East Greenwich) and Butcher (Old Kent Road); and they will take their seats on the Board to-morrow.

The Poll on the Skipton Gas-Works Purchase Question.—The votes of the ratepayers of Skipton on the question of the proposal of the Urban District Council to go to Parliament for compulsory powers to acquire the gas-works were counted last Wednesday, the result being: In favour of purchase, 1403; against, 431—majority, 972.

The Dangers of Electric Light Boxes.—Between ten and eleven o'clock last Wednesday night, an explosion occurred at the corner of Wellington Street, near the Bow Street end; and, upon an examination being made, it was found that an electric light box lying flush with the pavement had been blown out. The roadway for a distance of several feet was ripped up; and the iron cover of the box was hurled about 40 feet away.

Keighley Corporation Gas Supply.—It was reported at the meeting of the Keighley Town Council last Tuesday that, after providing for interest on loans, sinking funds, &c., the available gas profits were £6528, one-half of which it was agreed to place to floating capital account, £2000 to the credit of the rates, and to hold £1263 in suspense until the Gas Committee had considered the question of the proposed insurance funds. Alderman Paget gave some interesting statistics as to the progressive work of the Gas Department. For example, nearly 10½ million cubic feet of gas more were made last year than in the previous one; while the total production had risen from 91½ millions in 1878 to 259 millions in 1893. He did not anticipate that the prospective supply of electricity would materially affect the consumption of gas. Next to Widnes, Keighley produced gas at the cheapest net figure; and the Committee were now considering a memorial from some of the large consumers asking for a reduction in price.

The Truro Corporation and the Water-Works.—The negotiations between the Truro Corporation and the Water Company of the city respecting the transfer of the undertaking are proceeding slowly. At a meeting of the City Council last Tuesday, it was reported that the Water Committee had met the Directors of the Company, and discussed the matter, with the result that the Directors offered to give every facility to an expert to ascertain the value of the undertaking on behalf of the Corporation, and seriously consider any proposal that might be made to them as the result of his valuation. Mr. Carlyon said the Directors wanted the Corporation to offer a price for the works; and, as it was impossible for laymen to value them, they must obtain professional assistance. Personally he thought the suggestion of the Directors not at all unreasonable; and he therefore proposed that the services of an expert be obtained on behalf of the Corporation. Mr. A. Blenkinsop seconded the motion, and it was carried. The Water Committee will now submit the name of an expert for the approval of the Corporation.

Abolition of Soot by Gas-Stoves.—About three years ago attention was called in the "JOURNAL" to a remarkable result of the enormous extension which has been witnessed in the use of gas-stoves—viz., the abolition of soot, and the consequent decline in the business of the chimney sweeper. Further evidence of this was afforded at the West London Police Court last Saturday. It transpired that the trade of one of the fraternity was not in a flourishing condition, through the operation of the penny-in-the-slot system of gas supply. There were a number of summonses against parents who had neglected and were in arrears of their payments for the maintenance of their children in industrial schools. One of the defendants was a chimney-sweeper, who stated that he was not in a position to pay owing to a decline in the trade; adding that the penny-in-the-slot system had destroyed it. People used gas for cooking purposes, so that there were very few chimneys to sweep. However, he hoped to have some to attend to about Christmas time, when fires had begun. Mr. Plowden adjourned the summons in the hope that the defendant might have better times.

The Birmingham Gas Committee and Alderman Pollack.—A meeting of the Birmingham Corporation Gas Committee was held on Monday last week, when the chair was occupied for the last time by Alderman Pollack before his name is replaced upon the burgess list. At the conclusion of the ordinary business, the following resolution was passed: "That the grateful thanks of the Committee be given to Mr. Alderman Pollack for his devoted, unwearying, and valuable labours on behalf of the Gas Department, as a member of the Committee during seventeen years, and as its Chairman in fifteen of those years. That the Committee desire to acknowledge and record their sense of the importance of the services which he has rendered to the city by his assiduous, self-sacrificing, and zealous attention to the numerous duties which have thus devolved upon him, and their conviction that his patient and unremitting care for the welfare of the gas undertaking, in times which have not been without their anxieties, have contributed largely to the continued prosperity of the undertaking. They assure him that his unfailing courtesy and kindness in the discharge of the duties of Chairman have earned for him the esteem and regard of every member of the Committee. They regret exceedingly the unfortunate incident which for a time at least must deprive the city of the valuable services which he has so long and so willingly given, and the gas undertaking especially of the benefit of his ripe experience; and they trust that his accidentally enforced retirement from public work may be but temporary." It was decided to request the Finance Sub-Committee to have the resolution suitably engrossed for presentation to Alderman Pollack.

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Bridlington Water-Works Purchase.—In connection with this matter, we understand that the Bridlington Water Company and the District Council have agreed to abide by any decision which may be arrived at by their Arbitrators as to the price to be paid for the water undertaking, without calling in an Umpire or further evidence.

Gas Workers' Wages at Oldham.—At the fortnightly meeting of the Gas Committee of the Oldham Corporation, last Wednesday—Alderman Gourlay in the chair—the report of the Sub-Committee upon the application of the retort men at the gas-works for an increase of wages (see *ante*, p. 926) was submitted. The application was that the men should be paid 5s. 6d. per shift instead of 5s., and that time-and-a-half should be paid for three Sunday shifts instead of two only. The Sub-Committee recommended that the shifts should be increased from 5s. to 5s. 3d., and that three Sunday shifts should be paid for instead of two. The recommendation was adopted.

The Award in the Morley Gas Arbitration.—Mr. J. Mansergh, the Umpire in the arbitration between the Morley Corporation and the Morley Gas Company to fix the price to be paid for the undertaking of the Morley Gas Company, has now made his award. The arbitration was held a few weeks ago (see *ante*, pp. 759, 819). The amount of the claim, as made out by the witnesses for the Gas Company, was about £133,650; while those for the Corporation put the value at about £80,000, which latter amount, however, did not include any allowance for compulsory purchase or cost of re-investment, these matters being left by the Corporation witnesses to be dealt with by the Umpire. The amount of the award is £109,866. In addition, however, to the gas undertaking, the Corporation will be entitled to the balance of various insurance and contingent funds, which amount to about £10,000, after the payment thereout of certain costs of the Company. The Corporation will also acquire some freehold property in the centre of the town which belongs to the Company, and other land purchased by them, but not at present used.

The London Water Companies and Hertfordshire Water.—At a meeting of the Hertfordshire County Council held at St. Albans on Monday last week, it was decided to memorialize the Local Government Board as to the serious injury done to the water supply of the county by the enormous quantity of water daily abstracted from it by the London Water Companies. Sir John Evans strongly protested against the conclusions contained in the report of Lord Balfour's Commission, urging that they were totally wrong and unfair. The Chadwell spring had failed, and the great spring at Woolmer's Park, Hertford, which formerly discharged upwards of a million gallons a day, had gone dry; in addition to which other springs had totally failed, or were greatly reduced in volume. The heads of rivers were lower down the valley than they had ever been known before. In numerous instances, the wells on the high lands were completely dry, and the bore-pipes in watercress beds had ceased to discharge. Instructions were given for evidence to be collected as to the condition of the springs, rivers, and water supply generally, to enable the Council to secure protection from the disasters which it was alleged must follow if the conclusions in the report of Lord Balfour's Commission were allowed to stand.

The Maidstone Corporation and the Water-Works.—A meeting of the ratepayers of Maidstone, convened by the Mayor (Mr. J. Barker), was held last Wednesday for the purpose of passing a resolution authorizing the Corporation to promote a Bill in Parliament to empower them to purchase the undertaking of the Maidstone Water Company. The resolution was carried by a great majority, but a poll was demanded.

Another Successful Water Diviner.—Messrs. Luck Bros., of Wadhurst, have lately been trying to obtain water at some semi-detached houses they have recently erected at Durgates. Some time ago they dug a well nearly 80 feet deep, and finding no water, employed a firm to bore. After going down 150 feet without success, the attempt was given up. A local resident, however, who had witnessed the experiment of discovering water by means of a hazel twig by a well-known exponent of the art, determined to try what he could do himself; and he has proved most successful—pointing out that water would be found in a certain spot at a depth of about 50 feet. Boring was commenced at the place indicated. In a few days water was reached at 51 feet, and it now stands up the borehole 22 feet.

Adoption of the Vale of Clwyd Water Scheme.—The Ruthin Rural District Council met on Monday last week, when Mr. John E. Thomas, of Wrexham, was in attendance, and produced the plans, sections, and estimate he has prepared by direction of the Council with respect to the proposed new water supply for certain parishes in the Vale of Clwyd. In his report, Mr. Thomas stated that the source of supply was Nant-y-Ne, on the western slopes of Moel Famman; the gathering-ground being 307 acres on the open mountain formed of upper silurian rocks. The reservoir would be 650 feet above sea-level, and the erection of the dam would be facilitated by the configuration of the glen. The total estimated cost of the works was £3700. A resolution was passed, without opposition, approving of the scheme; and it was agreed to approach the Lord of the Manor for the purpose of securing the water rights of the watershed and land for the reservoir.

Messrs. Graham, Morton, and Co., Limited, have received an order from the Government for a consignment of their patent stamped steel seamless trucks (pressed by hydraulic machinery), for use in the Woolwich Arsenal.

Messrs. Joseph Taylor and Co., of Bolton, have in hand solid-plate lead saturators of the latest design for the Nottingham Corporation Gas Department, the Southampton Gas Company, and the Sheffield Chemical Company; their combined weight being 20 tons. This is the thirteenth order for saturators received by the firm during the present year.

In the "JOURNAL" last week (p. 936), reference was made to an exhibition of gas-stoves recently held by Messrs. Richmond and Co., Limited, in the Corn Exchange, Cambridge. It was there stated that the Cambridge Gas Company would lay services and supply meters and stoves free. We are informed that, as the result of this concession, the above-named firm succeeded in obtaining, during a four days' exhibition and the following week, orders for 225 cookers and 100 gas-fires; being as much business as was done in the city during the previous eight years.

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[For Illustrated Advertisement, see p. 998.]

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Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

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MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, Nov. 15, 1898, at Two o'clock precisely, in Lots,

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ANALYSIS.

Yield of Gas per ton .	10,500	Cubic Feet.
Illuminating Power .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

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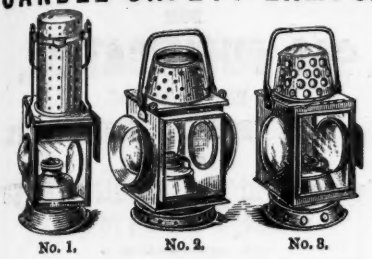

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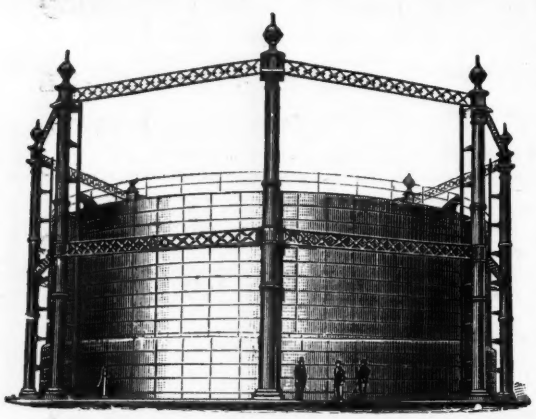

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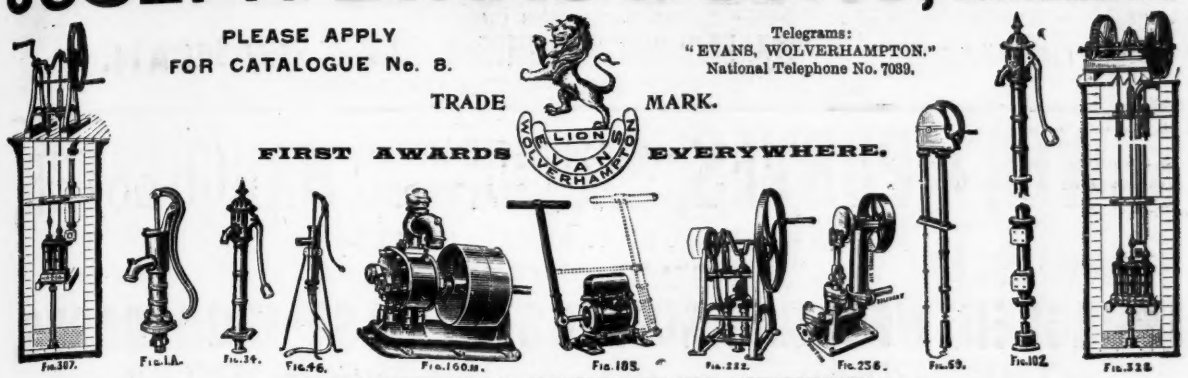

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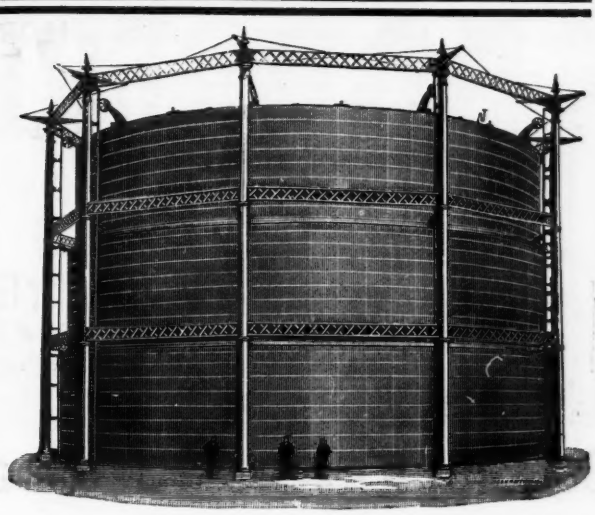

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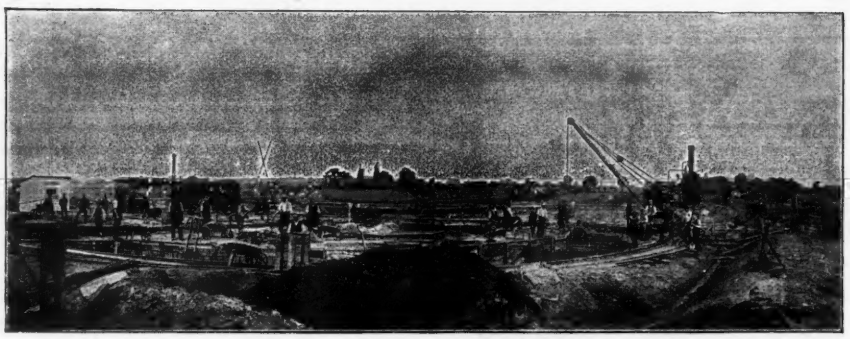

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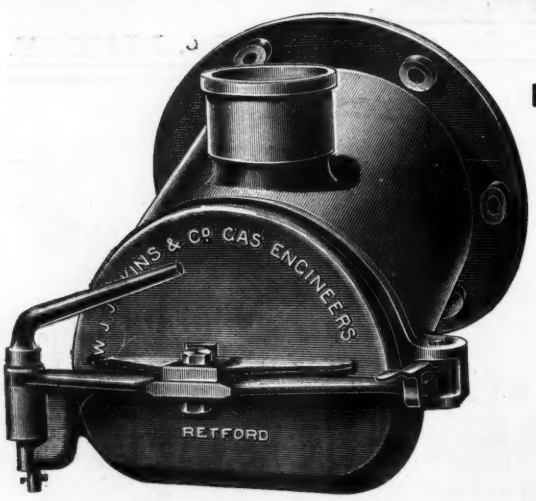

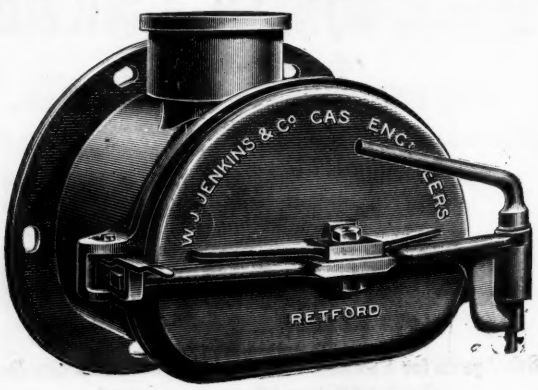

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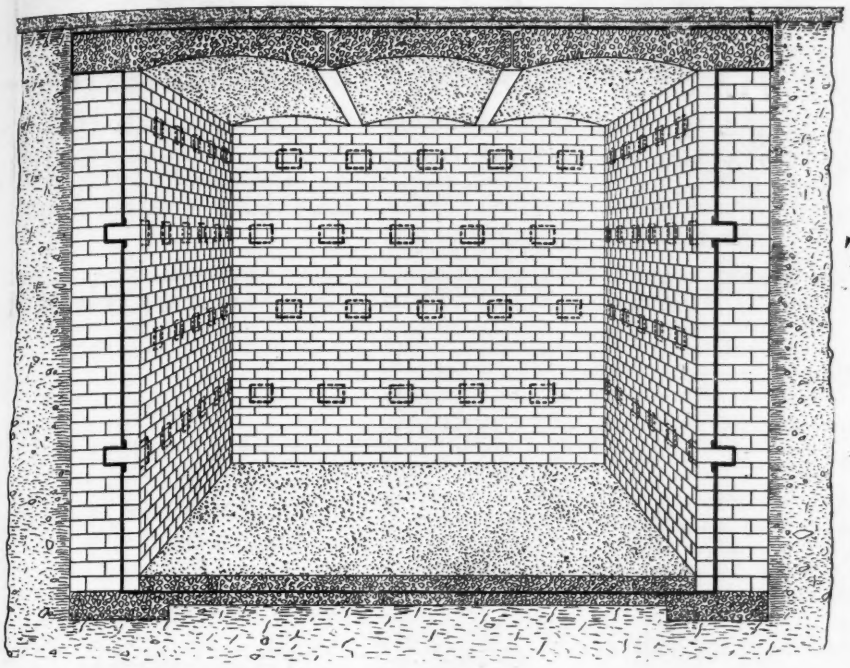

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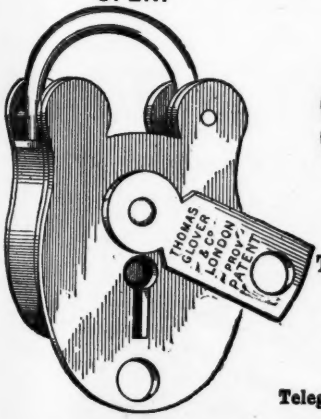

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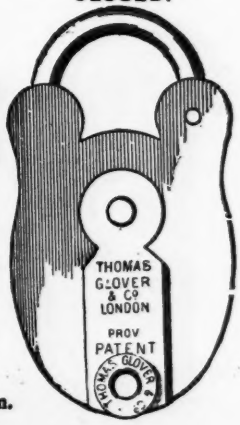

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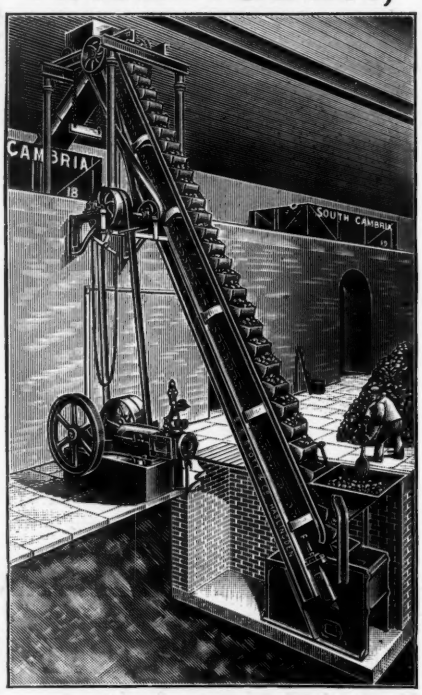

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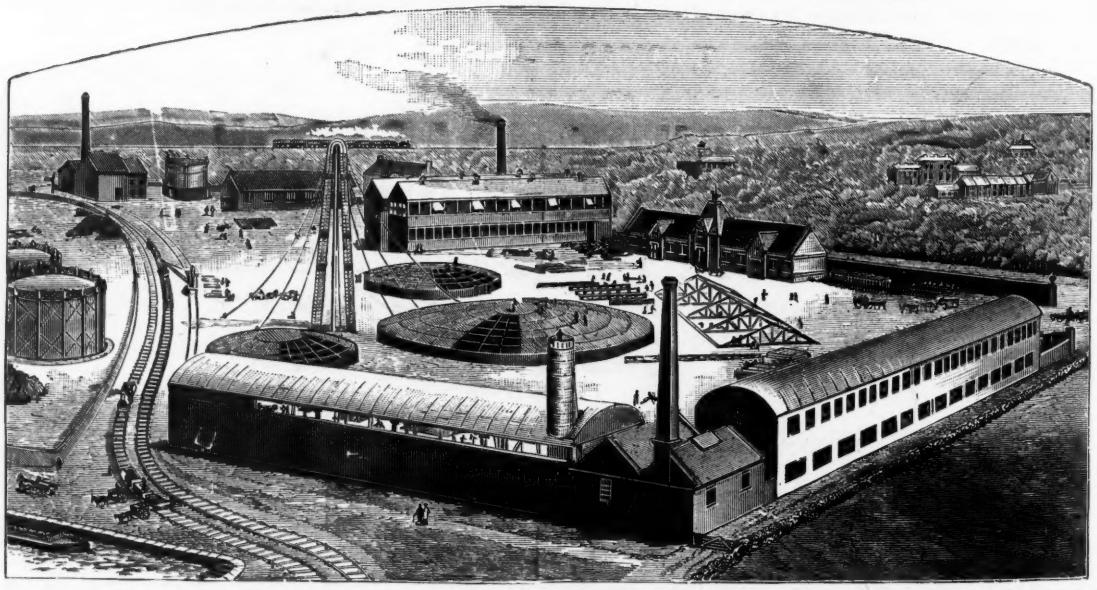

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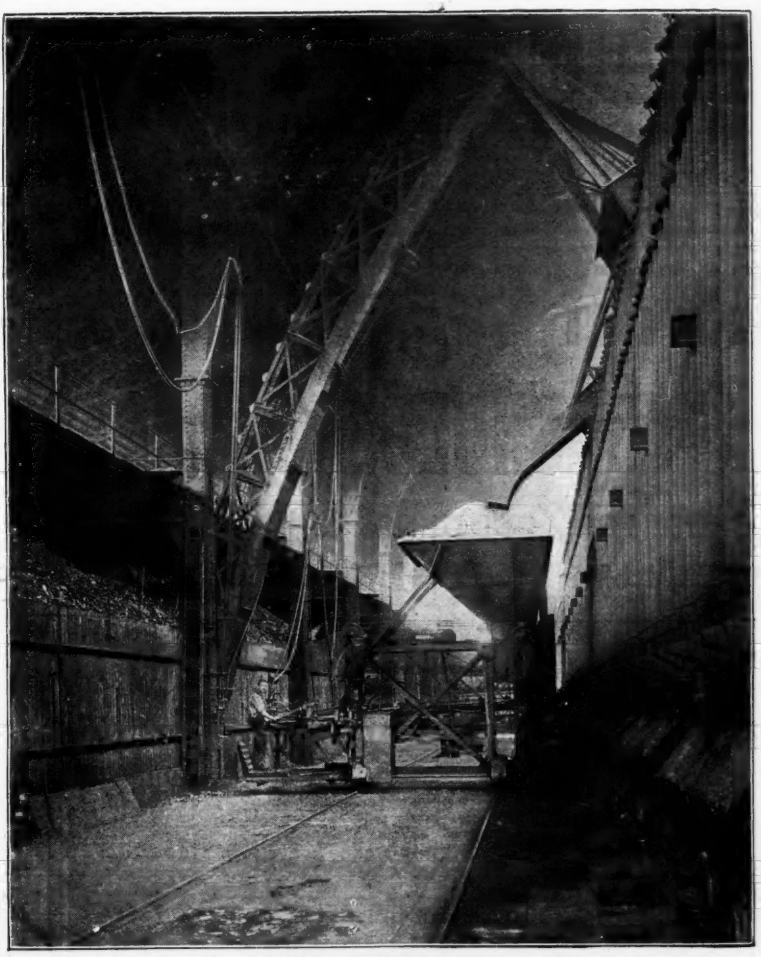

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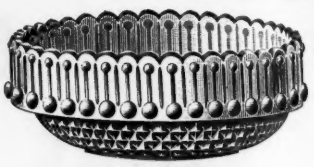

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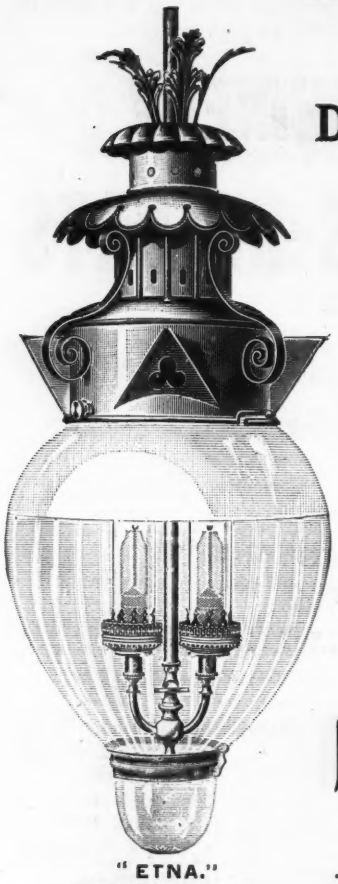

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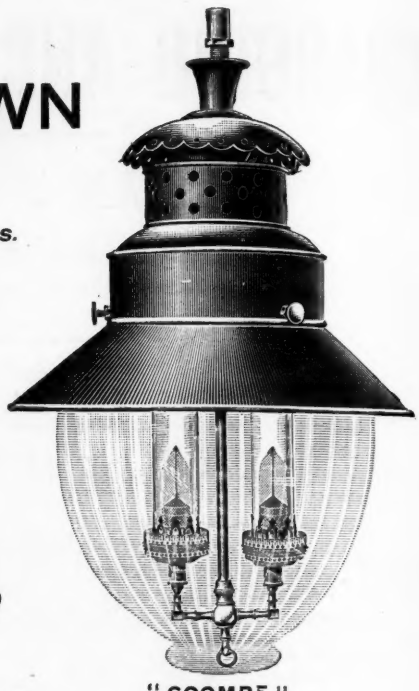

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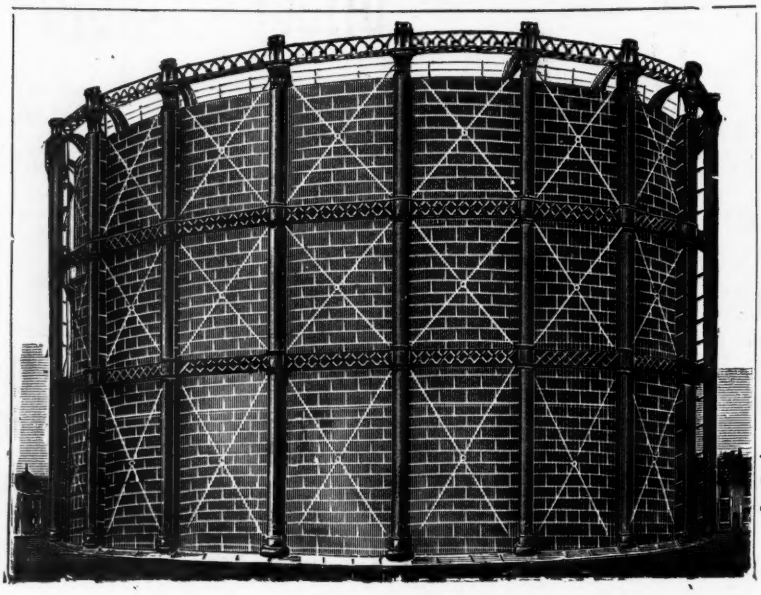

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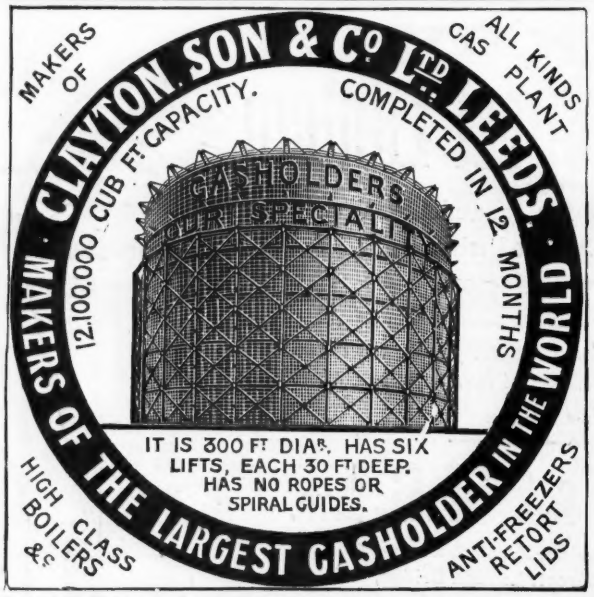
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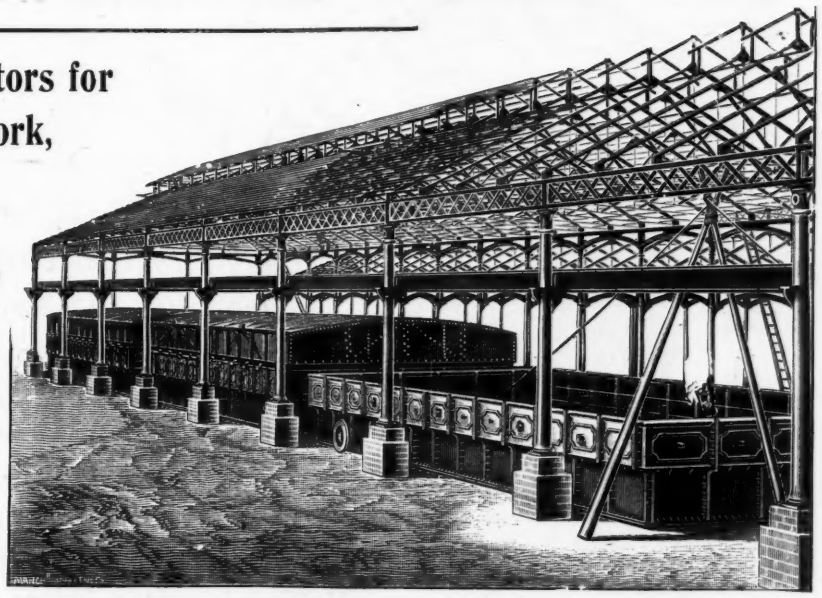

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